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Attorneys for Plaintiff
Gemini II Ltd.

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

GEMINI II LTD.,

08 Civ. 6334 () ()

Plaintiff,

- against -

**DECLARATION OF
DANIEL L. ROBSHAM**

DERECKTOR SHIPYARDS CONN., LLC,

Defendant.

Daniel L. Robsham hereby declares under penalty of perjury:

1. I am presently employed by Patton Marine, Inc. as a surveyor for large yacht new construction, pre-purchase, insurance, condition and valuation, damage and regulatory surveys worldwide. I hold various USCG licenses and other certificates related to maritime and marine survey activities. I graduated with a Bachelor of Science degree in Marine Engineering with high honors in 1982 from the Maine Maritime Academy. I was an exclusive surveyor for the American Bureau of Shipping from June 1994 through July 1999. I am a National Association of Marine Surveyors - Certified Marine Surveyor, Hull & Machinery, No. 109-847. A copy of my curriculum vitae is attached to this Declaration as Exhibit 1. For the past nine years, I have specialized in reviewing and surveying large yacht construction on a worldwide basis. During this time, I have acted as a surveyor for more than 45 large yachts under

construction and have examined large yachts under construction in not less than 40 shipyard facilities including in the USA, Holland, Germany, Italy, France, Spain, Turkey, New Zealand, Australia & Canada. As a result of this experience, I have an understanding of the best yacht building practices in the industry.

2. I have been retained by Gemini II Ltd. to act as a consultant and surveyor with respect to the yacht presently under construction at the Derecktor Shipyard located in Bridgeport, Connecticut. The yacht is known as the Project Gemini and has a Builder's Hull No. 85135. The yacht is a 145 foot catamaran sailing yacht which, according to the specifications attached to the Contract, was designed to have a tonnage of 499 tons. Pursuant to the introductory paragraph of the Contract, the Owner and the Builder agreed that the Builder shall build the Vessel located at Bridgeport, Connecticut using "the best yacht building practices." The general conditions of the specifications attached as Exhibit 2, reiterate this standard by stating: "it is the intent of this design and specification to construct a super yacht to the highest standards of construction and outfitting." Similarly, Paragraph 01.05 of the Specifications incorporates this concept in the following sentence:

The Builder shall guarantee skilled workmanship, in keeping with the best yacht construction practice and in conformity with the plans and specifications as approved in writing by the owner's representative.

3. I have attended at the shipyard since June 30, 2008. When I arrived at the shipyard, I toured the Vessel. The Vessel was in the main construction building at the Derecktor Shipyard. That building is a fully enclosed building of permanent nature. It is thermally insulated, electrically lighted and includes forced ventilation, gas fired heat, electricity, plumbing and an overhead crane. It also has extensive mezzanine staging areas permitting outfitting and preparatory work to be performed with easy access to the main deck of the Vessel. This type of facility conforms to the generally accepted best yacht practices.

4. While I was at the Shipyard during the week of July 7, 2008, I also observed fewer than 10 shipyard tradesmen working on the Vessel at any one time.

5. I was advised on or about June 30, 2008 that Derecktor Shipyards intended to move the Vessel from the building to another structure that had been erected on the Shipyard premises, and that, on or about July 12, 2008, Derecktor Shipyard did move the Vessel to this other structure. This structure consists of three walls made from stacking apparently empty shipping containers, three high, with a corrugated metal roof attached to the upper most level of the cargo containers. One side of the cargo container structure is not enclosed at all. I visited this structure on several occasions, most recently on July 11, 2008. At that time, the building could not be climate controlled because it was not fully enclosed. In addition, although electrical conduit piping was attached to the interior of the building, the necessary wiring was not apparent. There was no overhead crane, plumbing or running water apparent in the structure. In addition, there were no mezzanine areas for off-ship preparation of materials and easy access to the main deck of the Vessel. A drawing provided to me indicates a small staging area is planned to be created by stacking empty cargo containers inside the facility, two high and two deep. The area created atop these containers will apparently be less than 20% of the mezzanine level staging and workshop areas that were available to the persons formerly working on this yacht in the permanent building. I am also advised that Derecktor Shipyards was asked to provide a Certificate of Occupancy for the cargo container structure, but that no such Certificate was produced.

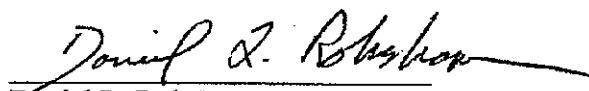
6. Placing the Vessel into this type of structure plainly does not conform to the best yacht building practices. The Vessel will be partially exposed to the elements. Plainly, this is not in accordance with Paragraph 01.09 of the Specifications which provides:

The vessel shall be built at the Builder's yard under a permanent roof with suitable climate control, and will be delivered as per terms of the Contract.

In addition to a fully enclosed structure, best yacht building practices requires a structure which is fully climate-controlled, with an overhead crane and a mezzanine for the efficient staging and movement of equipment and materials. Since the structure to which the Vessel was moved does not provide full enclosure, an overhead crane or a mezzanine, Derecktor Shipyard is not currently conforming with the best yacht building practices.

This Declaration is made under the penalties of perjury of the United States of America.

Signed this 13th day of July, 2008.


Daniel L. Robsham

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EXHIBIT 1

Daniel L. Robeham
Marine Surveyor – Hull & Machinery

Licenses & Certificates	Chief Engineer Motor & Gas Turbine Vessels Any HP, USCG (Equivalent to UK Class B)	1991, renewed & remains current
	Non Destructive Evaluation for Marine Surveyor	1995
	Welding Inspection for Marine Surveyor	1995
	Shipyard Competent Person (Gas Free & Tank Entry)	1995
	ISO 9000 Lead Auditor Course to IRCA Standards	1996
	Certified ISM Auditor to SOLAS/IACS Standards	1996
	Shipboard Firefighting & Damage Control	1979-1980
	NAMS-Certified Marine Surveyor Hull & Machinery	2004
	ABYC Marine Corrosion Technician	2006
	ABYC Standards Accreditation Course	2007
Education	Marine Maritime Academy, BS Marine Engineering, High Honors, 1982 Minor Concentration in Marine Industrial Management	
Employment History	August 1999-Present	Patton Marine, Inc. Miami, FL
	<p>Patton Marine surveyor for large yacht new construction, pre-purchase, insurance, condition & valuation, damage and regulatory surveys worldwide. Currently responsible for International new build projects total value over \$100 million, including specification reviews, negotiation and oversight of construction on behalf of owners. Also engaged on a daily basis for pre-purchase, insurance and other surveys. Specialties include mechanical, electrical, hull construction and regulatory matters under any flag or class society.</p>	
	June 1994 – August 1999	American Bureau of Shipping USA & UAE
	<p>Classification surveyor for new construction, conversion and overhaul projects for vessels of 75 tons through 555,000 tons. Responsible for planning and execution of hundreds of ABS related surveys afloat, at shipyard facilities and shore side fabrication locations.</p>	
	<p>Assignments included Norfolk, VA & Dubai, UAE. Conducted & reported upon periodic surveys, damage & repairs, dry docking, conversions, vessel condition assessments, Loadline, Tonnage, SOLAS and MARPOL surveys, GMDSS surveys, statement of fact surveys, change of flag surveys and ISM certification audits. Certified & verified materials, welding procedures, welders and service providers to recognized industry standards. Oversight & review of hull gauging, underwater examinations and inclining experiments. Recommended vessel repair plans and verified the repairs were carried out and tested properly. Advised clients on cost effective and reliable repair methods proven in service. Required to accurately and promptly report surveys, issue certificates and prepare invoicing information.</p>	
	<p>Assignments were high visibility positions within the industry, as the Dubai location served the Persian Gulf region, including tanker & container trades, offshore petroleum sector and</p>	

coastal vessels. Attended vessels for major clients on a seven day per week basis in the Dubai, Abu Dhabi, Kuwait and Fujairah areas.

August 1990 to June 1994

MEBA Washington, DC

Researched maritime industry developments for the domestic, military & international markets. Developed useful contract spreadsheets, detailed reports & correspondence to support negotiations and positions. Summarized legislative and commercial issues in order to forecast their affect on the U.S. flag merchant fleet and the organization. Public contact & speaking, as well as extensive writing was required in the post.

Served as licensed marine engineer aboard a variety of merchant vessels operating in liner, tanker & passenger trades from August 1990 through February 1993. Responsible for watch standing troubleshooting, maintenance & repair of shipboard systems during Atlantic, Pacific, Mediterranean and Caribbean voyages.

May 1982 to August 1990

US Navy Military Sealift Command

Licensed marine engineer aboard civilian vessels operated worldwide in support of the Department of Defense. Increasing responsibilities for operation, maintenance & repair of shipboard electrical & mechanical systems. Advanced from Third Assistant to First Assistant Engineer aboard automated/UMS diesel & steam powered vessels from 7200 to 33,000HP. Ultimately responsible for daily employee management, maintenance planning & record keeping, vessel-shipyard coordination and successful conduct of regulatory body inspections. Involved in multiple ship overhaul & dry docking projects throughout the period.

Experienced in preparing work orders and monitoring activities associated with new construction & repair specifications. Shore side tour at Avondale Shipyards during construction of 190,000bbl diesel powered product tanker. Conducted pre-delivery hull & machinery inspections/test routines as member of owners representation team.. Embarked as ships engineer and remained with the vessel throughout the two-year post delivery period, including the first scheduled dry docking. Maintained the post delivery guarantee item database and interfaced with builders engineers to ensure outstanding issues were resolved in favor of owners.

**Other &
Personal**

Since 1994 have successfully represented clients interests for over \$100 million of insured marine losses and over \$2 billion in new vessel construction

Expert witness, marine survey, US District Court – New Orleans, LA

48 years old, non-smoker

Married, Good Health – no disabilities

Eligible for Insurance Bonding

Languages Spoken – English & French

Languages Limited – Spanish & Italian

EXHIBIT 2

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B1 GENERAL CONDITIONS

This specification is for the construction of a 145' catamaran sailing yacht according to plans and specifications dated April 24, 2005. It is the intent of this design and specification to construct a super yacht to the highest standards of construction and outfitting.

The yacht is intended for private use and charter (commercial use) and is intended for year round, worldwide cruising, all seas excluding ice, with trans-oceanic capability. The yacht is to be Classed and delivered with the following certificates:

1. Bureau Veritas Rules for the Classification of Yachts :
• HULL • MACHINE
2. MCA; 512 passengers; 5500 GT
3. Cargo Ship Safety Certificate
4. MARPOL Annex I, IV, V and others as required (SOPEP review by Class)
5. International Load Line Certificate (ILLC 1966)
6. International Tonnage Certificate (ITC 1969)
7. Letter of Compliance for Minimum Safe Manning
8. Panama Tonnage Certificate

All certifications and regulations are to be current at the time of delivery to the Owner.

The Builder will assist the Owner in establishing the ISM Safety Management certificate and Certificate of Registry.

B1.01 Contacts & Legal Addresses

Project Name:	Gemini Project
Naval Architect:	Van Peteghem & Lauriet Prévost Yacht Design 11 Blvd Bourdon 75004 Paris, France email : gemini@vpdp.com
Marine Engineer:	Taylor Marine Services, Inc. Harvard, MA 01451 USA Email: taylormarine@charter.net
Interior Design:	Michael Leach Design London, UK

B1.02 Principal Characteristics

Flag State:	Cayman Islands
Hull material:	Aluminium
Hull form:	Catamaran
Length over all:	44.2m
Length water line:	40.8m
Molded Breadth:	16.6m
Molded Depth:	1.7m
Draft:	2.8m
Sail area:	848m ² (up-wind) / 1112m ² (reaching)
ITC 1969 tonnage:	4991
Light Ship Displacement:	210T
Fuel Capacity:	30365 liters

Water Capacity:	4500 liters
Anchoring Systems:	Classed
Subdivision:	ten (10) watertight compartments
Decks:	Three (3); cabin deck hulls, main deck, upper deck
Propulsion:	Two (2) Caterpillar; model: C-12; rated: 454 hp @ 2100 rpm
Generators:	Three (3) Northern Lights; model: NP445D; rated: 40 kW; 208/3/60

01.02.01 Units

Units used in this specification:

1 meter ~ 3.281 feet
 25.4 mm ~ 1 inch
 1 tonne ~ 1000 kg ~ approx. 2200 lbs
 1 liter ~ 0.265 US gallons

01.02.02 Dimensional Tolerances

Hull alignment and dimensions are to be monitored during the construction period. The following structural tolerances will be followed:

Hull Length:	± 44.2 mm	(1.75")
Breadth:	-0, + 25 mm	(-0", +1")
Depth:	± 25 mm	(± 1")
Frame spacing:	± 5 mm	(± 3/16")
Deck heights:	± 6 mm	(± 1/4")
Longitudinals:	± 5 mm	(± 3/16")
Bulkheads:	± 5 mm	(± 3/16")
Shell deflection:	- 3 mm, +0 mm	(before use of filler)
Hull vertical alignment:	± 35 mm	(1.4")
Hull parallel:	± 25 mm	(1")
Bow-Stern Diagonals:	± 45 mm	(1.75")

01.03 Plans and Specifications

It is the intent or spirit of this specification and the plans to construct and furnish a yacht complete and outfitted in every respect and ready for her intended service. All articles of equipment to be furnished by the Owner shall be specifically mentioned herein, and, if not specifically mentioned, are assumed to be included. Omissions from the plans or specifications, or both, of any items, which according to the generally accepted practice, are necessary for the proper operation of the yacht, shall not release the Builder from supplying same.

In all cases where discrepancies exist between the specifications, schematic plans and the contract, the contract shall govern, followed, in order, by the specifications, plans and schematics.

The plans and specifications are intended to be consistent and in harmony, and any work called for in the plans and not in the specifications, or vice-versa, are to be executed as though mentioned in both.

All plans and specifications are to remain the property of the Owner or Architect.

01.04 Builder's Responsibilities

The Builder will be responsible in all aspects to construct the vessel in accordance with these specifications and design as put forward by the Architect and as represented by this specification and the Architect supplied drawings.

It shall be the responsibility of the Builder to carefully check purchase orders, and also to check all materials delivered, to ensure conformity with the details of the specifications and with all normal working requirements, including installations within the available space.

The Builder shall accept his obligation to review all specifications, plans, schematics, arrangements and Details, collectively the Details, submitted by the Architect and to accept responsibility for the proper construction of the yacht, as though same were of the Builder's own design. Unless the aforementioned details have been rejected in writing, the Builder is required to proceed with the work as set forth in the details.

01.04.01 Specifications Intent

These specifications are for tendering and construction purposes. Principal items, such as systems, equipment and machinery, have been specified for life cycle, weight and performance criteria. Specified items are intended to be restrictive rather than descriptive, and are of the type and grade of articles that will be satisfactory. If the Builder proposes alternative equipment, the weight, life cycle, performance criteria and cost differences will be specified in the tender.

Where the phrase "or equal" is used in these specifications, the Builder may propose alternative equipment based upon life cycle, weight and performance criteria. If the Builder proposed alternative equipment, it is required that the weight, life cycle, performance criteria and cost differences be provided in the tender.

01.04.02 Weight Control

Of prime importance for a multihull sailing vessel is minimizing weight as this criteria is a critical factor affecting performance. Under such circumstances, the Builder will propose a weight control program to monitor the weight of the construction.

As newer, stronger and lighter materials are developed after the specifications have been written, and as the build proceeds, the Builder may propose alternative materials to the specified materials, and the impact on weight and cost for the Architect and owner to review.

The Architect may propose alternative materials to the specified materials. In this instance, the Builder will provide its impact on weight and cost. In all circumstances, the Architect and owner will have final choice of materials. Please see: 01.04.04 Alterations & Extras.

01.04.03 Weight Calculations

Before the final Lines Plan is completed, the Architect will hand over the total weight calculation to the Builder for approval. The Builder will check the weight calculation made by the Architect. The total displacement will be calculated in the following condition "fully loaded, ½ tanks".

The Builder shall be responsible for meeting the weight calculations and shall institute a weight monitoring procedure and track weights.

The Builder will propose a weight monitoring procedure plan for Evaluation. Such a procedure should include weighing of every thing that goes on and off the vessel, and periodic weighting of the entire structure for both weight and LCG. The Builder must submit 'real time' weights to the Architect for review on a monthly basis.

Complete vessel including:

- Masts and booms
- Standing/running rigging
- Sails: mainsail, foresail, jib, staysail, sail covers
- Spare parts
- Tools
- Upholstery
- Ball tanks
- Safety equipment
- Owner furnished items listed in part 16.02

01.04.04 Construction Process

The Architect will be consulted regarding any and all recommended substitutions and he will be asked to confirm that there will be no sacrifice in quality, additional weight, or performance. However, in all cases, it is understood that the final decision and authority to the Builder will remain with the Owner's Representative. Changes from the items listed by trade name shall be made only with the approval in writing from the Owner's Representative. This condition is to have effect whether or not such terms as "or equal" are used.

Where no specific supplier has been named, the Builder is to select more than one supplier for the equipment, and being satisfied that the equipment meets the requirements of the details, is to obtain Owner's Representatives approval before purchasing and installing equipment.

The Builder is to review all plans, drawings, subcontractor parts and specifications to satisfy the Builder that the intended objectives and requirements will be achieved.

Specific items where required by the Classification Society, such as main hull materials and machinery are to have test certificates issued by relevant manufacturer and inspecting authorities, where applicable. All original and one certified copy of all certificates are to be provided to the Owner's Representative.

All post contract costs of testing, certification, Classification expenses, including Plan Approval, Surveys, Trim and Stability Calculations, Freeboard and Tonnage Measurements, Dock and Sea Trials are to be included in the Price unless alternative contractual arrangements have been made.

01.04.05 Alterations & Extras

Should the Owner deem it necessary or advisable during the course of construction to make changes in the layout or details, so long as the general style and type of the Yacht and it's arrangements are maintained, such changes are to be made by the Builder without invalidating the contract and without adding expense, provided these alterations are determined before the particular part of the work to which they refer is commenced.

01.05 Materials and Workmanship

The Builder shall make all efforts to minimize weight of materials and components in the project.

The Builder shall guarantee skilled workmanship, in keeping with the best yacht construction practice, and in conformity with the plans and specifications as approved in writing by the Owner's Representative. During construction, any work or materials found defective on

unsuitable by the Owner's Representative shall be removed and replaced without extra charge, regardless of the stage of construction.

All materials and manufactured articles furnished by the Builder shall be suitable for marine installation and shall be of the best quality for their respective purpose.

It shall be the responsibility of the Builder to carefully check purchase orders, and also to check all materials delivered, to ensure conformity with the details of the specifications and with all normal working requirements, including installations within the available space.

The selection of fastenings shall be Allen head or square head fasteners. Fasteners will be high-grade stainless steel, or other material with galvanic compatibility to be considered.

01.06 Owner Furnished Items

Inventory items listed in part 16.02 will be owner supplied items.

01.07 Mock-ups

The Builder will cost separately, provide a space and construct mock-ups of the following areas:

- Anchor arrangements (1/4 scale)
- Salon and flybridge deck steering stations
- Salon and aft deck
- TV lounge
- Owner's suite
- One (1) guest cabin
- Galley
- Dive compartment (port lazarette)
- Tender compartment

01.08 Offices, Access & Inspection

The Owner and his authorized representatives shall have access to the vessel and everything pertaining to the vessel at all reasonable times. The Builder will do its utmost to facilitate the work of the inspectors. The Builder shall provide all normal assistance and materials necessary for the purpose of inspection.

The Builder will provide office facilities and space for the Owner's Representative. This shall include:

- Access for a minimum of 1 telephone lines
- High speed internet access cable (independent of yard)
- Offices for Project manager/Owner's representative
- Meeting room access

Additional requirements for video support for monitoring of construction will be made available.

01.09 Protection during construction

The Builder will use its best efforts to protect all work and owner supplied items at all times and be responsible for and make good any and all damage from whatever cause, to any part of

the vessel or its equipment or furnishings, whether supplied by itself or by the Owner. All items are to be marked for the Project upon arrival, weighted and put in secure storage.

The vessel shall be built at the Builder's yard under a permanent roof with suitable climate control, and will be delivered as per terms of the Contract.

The Builder shall maintain adequate insurance to cover both first party and third party claims, naming the Owner and Owner's Representatives as further and additional insured's and loss payees.

01.10 Accessibility for workmanship and cleaning

Convenient access to compartments for cleaning out and maintenance shall be provided to all parts of the vessel. Flooring throughout shall be fitted with suitable access hatches.

Convenient access to the engines, steering gear and all other equipment shall be provided. Care shall be taken in locating pipes and other parts to avoid blocking of access. If necessary, removable sections shall be utilized.

01.11 Lifting

The Architect will supply a 3D model to the builder. The builder will be responsible for the lifting and nesting.

01.12 Plans

01.12.01 Contract Plans

The following plans are delivered as the contract plans:

- Floorboard drawings
- Safety plan -- Profile
- General arrangement -- Cabin deck
- General arrangement -- Main deck
- General arrangement -- Flybridge
- General arrangement -- Longitudinal sections
- General arrangement -- Transverse sections
- Deck plan
- Flybridge Bimini arrangement
- Sail plan
- Longitudinal and transverse forward beams
- Stanchions & railings
- Tender compartment + launching principle
- Platform arrangement
- Starboard transom arrangement
- Air passercelle geometry operation
- Side passercelle
- Deck latches and lockers
- Anchoring arrangements
- Mooring arrangements
- Elusatory arrangement
- Systems layout
- Hull portlights
- Preliminary engine room arrangement
- Trucks layout and geometry

- Color renderings
- Fire, noise, vibration and insulation package by SilentLine BV

01.12.02 General Plans & Documents

The Architect will supply drawings and studies including, but not limited to:

- Hull lines plan
- 3D model
- Hydrostation
- Stability report approved by class society
- Weight studies
- Rudder geometry
- Mast plans
- Rigging plan & rig loads
- Chutaplates geometry and details
- Stanchions / railing details
- Cove stripe & painting details
- Bridge & helm stations layout

As a rule, the Architect will provide concepts, geometry, functionality and esthetics of items but will not provide construction drawings or detailed drawings. These will be the responsibility of the Builder.

A detailed list of drawings will be produced between the Architect and the Builder specifying which party is responsible for their production prior to contract signature.

01.12.03 Interior Plans

Prior to contract signing, the following plans will be agreed between the Owner and the interior architect design and decoration team:

- General Arrangement
- Overhead and window
- Owner's suite
- VIP cabin
- Guest cabins and bathrooms
- Crew cabins and bathrooms
- Galley
- Crew mess
- Corridors
- Main deck salon and dining area
- Lower salon
- Wheelhouse
- Interior furniture details
- Special fixed feature
- General overhead plans
- Lighting arrangements
- Color perspective
- Longitudinal sections for each room or area
- Transverse sections for each room or area
- Elevation for each room or area

As a rule, the interior architect, design and decoration team will provide concepts and geometry of items but will not provide construction drawings or detail drawings. These will be the responsibility of the Builder.

01.12.04 System Schematics

The following schematics are included:

- Fuel system
- Lubr oil system
- Fire & Bilge system
- Fresh water system
- Sea water systems
- Waste water system
- Hydraulic system
- HVAC system
- AC electrical system one line diagram

01.13 Plan Approvals

The Builder will submit to the Classification Society for approval all necessary drawings for the proper construction and Classification of the vessel. Copies of approved drawings are to be provided to the Owner's Representative and Architect.

Any plans developed by the Builder should be provided to the Owner's Representative and Architect in duplicate, of which one copy may be electronic.

01.14 Trials and Tests

During trials, the yacht shall be at all times, in the care, custody and control of the Builder. Attendance of the Owner's Representatives, Architect, Class Society and regulatory authorities at the time of the trials, or the carrying out of requests to make certain runs or maneuvers, whether informally arranged or according to an established trial agenda, shall not serve to place the yacht in the care or control of the Owner's Representative, Architect, Class Society or regulatory authorities at any time and the Builder agrees to hold the Owner, Owner's Representatives, Architects, Class Society and/or regulatory authorities harmless in the event of loss or damage occurring during trials.

Trials will be conducted in accordance with the regulatory authorities' requirements and additionally:

- Prior to testing and inspection, all tanks and piping systems will be thoroughly cleaned and washed, and all slag, grit and debris will be removed.
- On completion of construction and prior to painting, all fuel oil tanks, ballast tanks, water tanks, oil tanks and sewage/sanitary tanks will be tested and inspected according to classification society requirements.
- Upon vessel completion, a thorough program of dock tests and sea trials are to be carried out to the satisfaction of the Owner's Representative, Architect and regulatory authorities. All proposed programs are to be submitted to the Architects by the Builder for approval before the vessel is completed. All operations covered by these trials are to demonstrate satisfactory performance and workmanship of all items, as to their suitability for the purpose intended, and to show that all requirements of the building specification have been met.
- All necessary sub-contractors or equipment personnel are to be present during their equipment commissioning or system trials.

- The trials to be conducted and staffed by the Builder, in the presence of the Owner's Representatives, Architects, Class Society and regulatory authorities and all data obtained to be recorded and tabulated by the Builder.
- Three copies of all data obtained are to be provided to the Owner's Representative and the Architect.
- The Owner's Representative shall have the right to select all fuel and lubricating oils and greases for commissioning and trials. All fuel and lubricating oil consumed during commissioning and trials shall be for the account of the Builder.
- All necessary materials and stores for the duration of the trials are to be provided by the Builder.
- After all trials a thorough examination of the vessel's structure is to be carried out. All system filters are to be changed and checked for foreign matter to ensure systems are thoroughly clean.
- Exhaust testing of all through deck fittings to be conducted after sailing trials.
- All defects found during these trials to be made good by the Builder and the vessel to be re-commissioned and thoroughly tested and all corrections approved to the satisfaction of Owner's Representatives, Architects, Class Society and regulatory authorities.

01.14.01 Dock Trials

Dock trials are to be conducted alongside the Builder's facility and are to include at a minimum the following trials:

- Main engines, propeller systems and related equipment
- Generators, electrical systems and related equipment
- All deck mooring and anchoring equipment
- Steering, emergency steering and thruster systems
- Calibration of all tanks
- Calibration of all sensors and monitoring systems
- All cooling systems
- Priming, pumping and endurance tests for all pumps and piping systems
- Manual and automatic controls and alarm systems

Sea trials may not commence until all dock trials have been completed and all defects or deficiencies are cured to the satisfaction of Owner's Representatives, Architects, Class Society and regulatory authorities.

01.14.02 Power and Manoeuvring Trials

The Yacht is to be laden to the equivalent of full load draft and taken to sea for a series of runs (one in each direction) over a measured distance to determine the speed at maximum continuous power in deep water and under agreed upon sea conditions.

Trials are to include a series of runs over a measured distance to determine H.P./R.P.M./Propeller Pitch/Speed Curves. These trials are to cover, maximum (100%) power, 80% of power, 60% of power and 40% of power.

High and low speed-maneuvring trials are to be conducted, to include full lock turning circle at maximum power and at such lower speeds as requested by the Owner's Representative, Architect and regulatory authorities:

- manoeuvring astern
- emergency stop at 80% power
- UMS operation and electrical blackout trials
- operation of all machinery while at sea

- anchor handling and anchoring trial

Sailing trials may not commence until all power and manœuvring trials have been completed and all defects or deficiencies are noted to the satisfaction of Owner's Representatives, Architects, Class Society and regulatory authorities.

01.14.03 Sailing Trials

Upon satisfactory completion of dock and power trials the Yacht will undergo sailing trials. Trials are to include a minimum of three 8 hour day trips at sea, with key Builder and principal sub-contractors' personnel aboard. During these trials the vessel's performance (boat speed, speed made good, course to apparent wind, apparent wind speed) is to be recorded. It is necessary for the satisfactory completion of sailing trials that they are conducted in suitable weather conditions; for full sail this should include true wind speeds of up to at least 16 knots. Trials under reefed conditions should be carried out in wind speeds of not less than 20 knots.

For the start of the sailing trials the vessel is to be loaded to at least median draft, stores and water to obtain cruising conditions.

The trials will include a testing of all navigation equipment as well as load sensors on the rig.

01.15 Stability Calculations

The Builder must show by design calculations that the vessel will meet the intact and damage stability requirements for a catamaran auxiliary sailing vessel as required by all relevant authorities.

The Builder is responsible for monitoring stability during construction and tracking all movements of the center of gravity. These will be submitted to the Architect on a monthly basis for review.

The appropriate stability tests will be conducted by the Builder when the yacht is fully rigged and ready for sea trials.

The Builder will deliver the vessel with an approved stability booklet.

01.16 Masts and Rigging

The Owner's Architect will decide the rig geometry and will provide same to the Builder with the dimensions for the mast and rigging. The Builder will deliver final dimensions to the mast builder.

01.17 Delivery of the Vessel

The Builder will deliver the vessel to the owner in accordance with the Protocol of Delivery and Acceptance, as set forth in the Contract, which means that the risk and expenses of the Yacht are transferred to the Owner from that date.

01.18 Ship Documentation Books

The Builder will submit the following books to the Owner and will also include all available information on CD. Storage for the records is to be provided in the wheelhouse, captain's office or control room as applicable and is to include:

- A. Technical Documentation

All available printed or electronic documentation of equipment, such as: operation manuals, workshop manuals, service stations, parts lists, drawings, schematics, paint systems, lubrication systems, etc. is to be provided. All documents are to be organized, completed and provided with an index.

B. System Descriptions

A description of all important systems and equipment on board is to be provided. Information such as: where it is located, how it is connected, what it is supposed to do, how to start, to stop and to run, together with essential information such as: part numbers, type numbers, reference to manufacturers is to be included. The system descriptions will be provided in separate books and on CD, with the documentation mentioned under C.

C. Maintenance Schedules

A preventive maintenance schedule for all equipment and coatings will be developed by the yard. The following intervals shall be applied. For example: daily, weekly, monthly, 3-monthly, 6-monthly, yearly, docking, 2-yearly and refit, as applicable all equipment and coatings. The maintenance is mentioned together with the step by step descriptions described more fully in section.

D. Coding Systems

A pipe coding system will be developed. The coding consists of self-adhesive arrows on a chrome-vinyl base in the international color code.

Electrical codes will be as specified in part 10A.

01.19. Abbreviations

The following abbreviations are to be used in the Specifications:

<u>Abbreviation</u>	<u>Word or Phrase</u>
• MCA	British Maritime and Coastguard Agency
• BV	Bureau Veritas
• SOLAS	International Maritime Organization for the Safety of Life At Sea, 1974 and its Protocol 1988 (as amended)
• ABYC	American Boat & Yacht Council
• Stbd	Starboard
• Tbd	To be determined
• HVAC	Heating, Ventilation & Air Conditioning

02 CONSTRUCTION OF HULL AND SUPERSTRUCTURE**02.01 General**

The hull will be of welded aluminum construction and built under the supervision of the Bureau Veritas, the Architect and the Owner's Representatives.

02.02 Materials

The vessel is to be constructed of 5383 H116 aluminum alloy plate with extended aluminum sections to be 6082 T6. Note that there is pending development of higher strength marine grade alloys that may be considered. 5383 extrusions may be considered to save weight, if sufficient quantities can justify extrusion.

02.03 Hull Construction

The scantlings and surfaces as listed on the structural drawings.

02.03.01 Bulkheads

All aluminum bulkheads are constructed of 5383 aluminum and 6082 T6 extrusions.

02.03.02 Structural & Non-Structural Glass

Structural and non-structural glass as per the architects plans.

2.04 Doors**2.04.01 Watertight doors**

Watertight doors will comply with the standards required for passenger vessels. The standards are defined in SOLAS Chapter II-1. The watertight doors will also display status on the M/M/C panel.

Watertight doors are located as follows:

Name	Number	Opening mode	Class	Location X	Size (mm)	Port/Starb
Port & Starboard engine room fwd door	2	Hinged	A-60	25200	1900 x 750	Both
Port & Starboard engine room side escape door	2	Hinged	A-60	21650	ibid	Both
Forward VCC cabins exterior doors	2	Hinged Folded to the wall	A-D	30595	2000 x 800	Both

02.04.03 Weather light doors

Name	Number	Opening mode	Class	Location X	Size (mm)	Port/Stbd
Main salon doors	1	Sliding	TBD	17950	1200 x 2300	Port
Main salon doors	1	Sliding	TBD	17950	800 x 2300	Stbd
Hall door	1	Sliding	TBD	17950	900 x 2300	Stbd
Companion way guests cabins Staircase	1	Sliding	TBD			Port
Companion way crew cabins Staircase	1	Sliding	TBD			Stbd

The main salon doors will be automatic opening, activated by sensors from both sides.

02.05 Hull Doors

The hull doors and tender hatches are to comply with SOLAS Chapter II-1, part 25-10.

The hull doors and tender hatches will be fitted with positive mechanical latches with fail safe arrangements. Hull doors will also display status on the MIMIC panel.

Hull door and hatch latching systems may be exposed in order to save weight.

02.05.01 Stbd Lazarette Hull Door

See drawing: *Gem_T09_stbd_transom_arrangement* and details in Bid Package phase II

The stbd hull door will open up, hinged on the upper edge. It will be used for access to launching the secondary tender. The tender will be launched with two C-Quip, or equal, beam cranes.

- * Opening width or length: 4750 mm
- * Opening height: 1600 mm
- * Height above WL: 500 mm

02.05.02 Port Transom Door

See drawing: *Gem_T04_port_transom* and details in Bid Package phase II

The port lazarette transom door will open up, hinged on the forward edge. This door will allow for full head room in the lazarette serving as the diving compartment.

- * Opening width: approximately 3550 mm
- * Opening length: approximately 1350 mm

02.05.03 Tender Hatch

See drawing: *Gem_T01_tender_compartment* and details in Bid Package phase II

Tender hatches will be hinged on the outboard sides and lower for launching and recovery of the main tender. There should a mechanical locking device, with manual override, to lock the doors into closed position. There should also be a locking system to hold the tender in position. Crew access will be from the main deck cockpit from two lateral hatches (see Deck Hatches and lockers) and lead to two platforms fitted inside the tender compartment.

- Opening length both door: 8900 mm
- Opening width, both door: 3150 mm (2 x 1575mm)
- Height above WL: 2000 mm
- Other equipment: Hydraulic hoisting system for tender

02.06 Chainplates

Chain plate size is to be determined. All chain plates are to be specified by the Architect.

02.07 Tankage

02.07.01 Fuel Tanks

See drawing: *Gem P03 & P06*.

The fuel system will comply with Bureau Veritas Rules, Part C, Machinery.

Tank volumes will be maximized for the space permitting in accordance with the construction plans.

Six (6) integral fuel tanks with a total estimated capacity of approximately 31,450 liters, located between 17950 and 26300 in the cross deck with inspection hatches, fill & vent pipes and other necessary fittings. There will be a passageway between the fuel tanks for controlling the filling manifold. These tanks will be provided with top manhole access for maintenance.

02.07.02 Fresh Water Tanks

Water tankage will be maximized. There will be two (2) integral water tanks with a total estimated capacity of approximately 8,600 liters, located in the cross deck, fitted with manholes, filling and vent pipes and connections.

02.07.03 Waste Water Tanks

Two (2) integral holding tanks of approximately 4000 liters each are to be located in the keels with manholes for inspection hatches and tank connections. These tanks will be provided with top manhole access and side manhole access for dry dock maintenance.

Four (4) non-integral black water collection tanks of approximately 350 liters each are to be located in the bilges with manholes for inspection hatches and tank connections. These tanks will be provided with top manhole access for maintenance.

The tanks will be specially constructed and coated for waste water.

02.07.04 Slop Tanks

Two (2) integral slop tanks of approximately 550 liters each are to be located in the bilges with manholes for inspection hatches and tank connections.

02.07.05 Sea Water Tanks

One (1) spa water tank of approximately 2000 liters is to be built in the port bilge located between 16000 and 18000. It should be fitted with manholes for inspection hatches and required connections.

02.07.06 Lube Oil Tanks

Two (2) integral hydraulic tanks of an approximate capacity of 500 liters each, are to be fitted as per the drawings.

02.07.07 Dirty Oil Tanks

Two (2) integral dirty oil tanks of an approximate capacity of 960 liters each are to be built in the bilges between frames 24 and 25. They should be fitted with manholes for inspection hatches and tank unconnections.

02.07.08 Hydraulic Oil Tanks

One (1) integral hydraulic storage tank will be fitted. Size and location to be determined.

Hydraulic reservoirs for the port and starboard thruster systems and main hydraulic pack are to be determined.

02.08 Anchor Hardware

Two (2) anchor chain attachment points are to be installed in the lower chain locker with release pins accessible via an opening hatch of pull mechanism.

The windlasses and chain stoppers will be installed in deck lockers with locking deck hatches.

02.09 Foundations for Deck Equipment

The structural reinforcement in way of all deck hardware will be determined by the Builder.

02.10 Foundations/Reinforcements

Engines and variable pitch propeller foundations are calculated in accordance with Class Rules with consultation from the noise and vibration consultant.

02.11 Hull Openings

The following is a provisional list of machinery space hull fittings.

Please see drawing: *Gem_CO2_freeboard_drawing*

Port Hull

- 1" Overboard Lazavette
- 1" Overboard Aft Guest Accommodation Bilge
- 1" Overboard Engine room Fwd
- 2" Overboard Engine room Fwd (Emergency Bilge Discharge)
- 1" Overboard Fwd Guest Accommodation Bilge
- 1" Overboard Fore Peak
- 2" Overboard Aft Guest Accommodation Bilge
- 1" Overboard Engine Room Fwd (Hydraulic oil cooling)
- 1" Overboard Engine Room Midship (Water Maker Back-flush)

- 4" Sea Chest Suction Engine Room Fwd (Inboard & Outboard Hull)
- 3" Overboard Engine Room Aft Outboard Shell, Below Waterline (Main Engine Wet Exhaust)
- 6" Overboard Engine Room Aft Outboard Shell, Above Waterline (Main Engine Dry Exhaust)
- 2" Overboard Engine Room Aft Outboard Shell, Below Waterline (Inboard Generator Wet Exhaust)
- 3 1/2" Overboard Engine Room Aft Outboard Shell, Below Waterline (Inboard Generator Dry Exhaust)
- 2" Overboard Engine Room Aft Outboard Shell, Below Waterline (Outboard Generator Wet Exhaust)
- 3 1/2" Overboard Engine Room Aft Outboard Shell, Below Waterline (Outboard Generator Dry Exhaust)

Stbd Hull:

- 1" Overboard Lazarette
- 1" Overboard Aft Crew Accommodation Bilge
- 1" Overboard Engine room Fwd
- 2" Overboard Engine room Fwd (Emergency Bilge Discharge)
- 1" Overboard Engine room Midship (Oil/Water Separator)
- 1" Overboard Fwd Crew Accommodation Bilge
- 1" Overboard Fore Peak
- 2" Overboard Aft Crew Accommodation Bilge
- 2 1/2" Overboard Engine Room Aft (A/C Chiller Cooling)
- 1" Overboard Engine Room Midship (Water Maker Back-flush)
- 4" Sea Chest Suction Engine Room Fwd (Inboard & Outboard Hull)
- 3" Overboard Engine Room Aft Outboard Shell, Below Waterline (Main Engine Wet Exhaust)
- 6" Overboard Engine Room Aft Outboard Shell, Above Waterline (Main Engine Dry Exhaust)
- 2" Overboard Engine Room Aft Outboard Shell, Below Waterline (Outboard Generator Wet Exhaust)
- 3 1/2" Overboard Engine Room Aft Outboard Shell, Below Waterline (Outboard Generator Dry Exhaust)

Wet deck:

- Cockpit, deck lockers, tender compartment, passageway and forward locker drains as required by the Rules.

03.13 Stern Tube

Two (2) Amatech "Easy Stern TubeSM" shaft systems with seals will be constructed into keel as per the drawings.

03.14 Watertight Bulkhead Penetrations

All watertight and gas tight penetrations of pipes, cables and wiring are to be as light as possible.

- Type: Rise or equal
- Approval: BV approved

03 STEERING INSTALLATION**03.01 General**

The yacht is to be provided with an electro-hydraulic steering system with helm wheels and lever steering located at the port and starboard (hybridge) steering stations and lever control steering from the salon control station in accordance with Class requirements.

The steering system is engineered and specified by Jastram Engineering, Ltd. The following main components are listed and details specified in quotation JX041237A are attached in (Appendix A)

A walk around maneuvering plug-in device to be provided from the upper deck.

- Manufacturer: Jastram Engineering Ltd
- Jastram specification: B2-300-9-1-35
- Type: Electro-hydraulic
- Rudder angle: 35/35
- Rudder torque: 4874 ft/lb per rudder
- Turning rate: 12.0 sec (35/35)

03.02 Steering Principle

The two flybridge helm stations will be operated by digital control helm units with supply information to the digital steering controller. The interior steering system will consist of a full follow-up and non-follow-up lever integrated with the digital steering controller.

03.02.01 Exterior Helms

Two (2) custom built steering wheels will be installed at the flybridge helm stations and constructed to the Owner's selection of style.

- Manufacturer: TBD
- Material: TBD
- Diameter: 1600 mm
- Type: Spokedness
- Helm actuators: DH36 digital helms

03.03 Rudders

The rudder blade will be built of carbon fiber. The stock will be built of Aquanet 22 HS and the internal foil diaphragm will be built of ANSL 316L, or as determined by the Architect. The lower stock diameter is 2000 mm and the upper stock diameter is to be determined.

03.04 Wheel/Rudder Transmission

The maximum rudder deflection will be 70°, hard over to hard over with a maximum steering wheel transmission will be adjustable.

- Fillers: Two (2) B-300
- Cylinders: Two (2) B-300-12-37-2

03.05 Power System

The system will be an electro-hydraulic system with shaft steering motors and cross-over valves. Steering motors will be located in each lazarette above the rudder and out of the bilge area. In the rudders. Attention will be taken to eliminate noise and vibrations from the steering system.

- Hydraulic Pack: Two (2) 2 hp @ 208/3/60
- Weight: TBD
- Controller: Two (2) motor starters
- Weight: TBD
- Alarm Panel: Four (4) AP-60
-

#3.06 Rudder Shaft Bearings

Each rudder is to be supported by a minimum of two (2) self-aligning bearings.

- Upper bearing: TBD JP3
- Lower bearing: 200 mm JP3

#3.07 Piping Systems

Piping systems will be high pressure stainless steel tubing. Tubing will be bead blasted in visible areas.

- Tubing grades: AISI 316/ASTM A269-04 or equal

#3.08 Emergency Steering

Emergency steering is provided by means of a hydraulic steering pump system with connecting valves to each rudder system. The steering pump is to be located in an aft main deck locker.

#3.09 Autopilot & Gyro System

Subject to integration with steering system and latest equipment models, the autopilot system will consist of:

Component	Manufacturer & Model
Gyrocompass	Anschutz: Standard 22 G/GM
Autopilot	Anschutz: Pilotstar D

For further details, please see the attached Leary Smith Electronics proposal.

04. MAIN ENGINE INSTALLATION**04.01. General**

The concept of the machinery space is to be executed with a high level of finish detail, including glossy paint and highly polished or bead blasted metal finishes. As such, the engines will be ordered as "Detailed" engines, complete with chrome and polished stainless steel finishes.

The Builder, with approval by the Architect will confirm the final engine specification, reduction gear ratio and propeller size prior to construction of the vessel.

The engines will be IMO MARPOL Annex VI compliant and arranged in accordance with Class and SOLAS regulations II-1/Part E and additional requirements for periodically unattended machinery spaces.

The propulsion system will be a twin engine, variable pitch propeller system. The system will be designed with a "maneuvering" mode in which the engines will run at a constant rpm, with alternastern maneuvering provided by the variable pitch propeller control. The builder will work with the Architect with the sizing of the thruster hydraulics to determine the power demand so that sufficient power is provided.

The engines will be arranged with maneuvering controls from all helm positions. The engine instrumentation for the helm stations will be provided on an electronic monitoring system.

The Builder will consult with a noise and vibration consultant to assure that the entire propulsion package (engine, reduction gear, propeller system, mounts and exhaust system) are optimized for noise and vibration control.

04.02. Main Engines

The main engines are as follows:

- | | |
|------------------|------------------------------------|
| ▪ Manufacturer: | Caterpillar |
| ▪ Model: | C-12 |
| ▪ Specification: | Inline 6 cylinder, 11.95L 4-Stroke |
| ▪ Power: | 454 hp @ 2100 rpm |
| ▪ Rating: | "C" Rated |
| ▪ Weight: | 1177 kg |

04.03. Engine Equipment

The engines will be fitted with specified Standard Equipment, plus:

- Engine monitoring system with interface to the vessel monitoring system
- Local engine instrument display system in each engine room
- Throttle position sensor
- Gear box PTO with remote activated clutch
- Airtight oil vapor trap and air filter
- Expansion tank
- Capriocket heat exchanger
- Seawater pump and inlet and outlet connections

- Crankshaft cooler
- Gear oil cooler
- Lube oil cooler
- Double wall oil lines
- Fuel oil cooler
- 24 VDC starter motors
- SAE-1 flywheel housing or as required
- Primary fuel filter and water separator
- Connections to oil change system
- Spare parts kit (2 each)

04.04 Gearbox

The reduction gear does not need to be a reversing gear as the pitch control will provide maneuvering. The following gear is listed as a guide only:

- Manufacturer: Twin Disc
- Model: MQ 5114-A, or as appropriate
- Ratio: TBD; preliminary data: 2.5:1
- Weight: 206 kg dry
- SAE bell housing: TBD
- Electronic clutch control
- Engine-matched torsional coupling
- Heat exchanger
- Connections to oil change system

04.05 Instruments

The each helm station will be equipped with monitor panels that display full engine and gear data and propeller pitch data and alarm status. This will be part of the vessel monitoring system.

Each engine location will also have a mechanical gauge package, including pitch position indicator. This display will be independent of the monitor system.

04.06 Controls

Engine controls are to comply with Class and MCA requirements.

Engines are to be started & stopped from local engine room control and the flybridge aft helm position (TBD).

Primary engine, gearbox and propeller pitch controls are to be available from all helm steering stations by an electronic system.

- Manufacturer: Bosch Rexroth Mini-Murex

As required by the Rules, back-up engine control systems are to be provided for local engine room control.

The variable pitch propeller control system will be approved by the pitch system manufacturer. Control is an electro-hydraulic system driven by the Lowmar Commander HPU or hydraulic power pack as specified in Part 07H Hydraulic Systems.

The engines and controls will still be provided with a reverse reduction gear controls in event of the pitch system to fail.

04.07 Elastic Couplings

The main propulsion installation to be equipped with elastic couplings:

Between input and gearbox:

- Manufacturer: TBD
- Type: TBD

Between gearbox and pitch system installation:

- Manufacturer: Amarteck
- Type: SE2840 DA

The specific model number will be decided after calculations.

04.08 Isolation Mounts

The engine/gearbox will be flexibly mounted on four (4) rubber mounts.

- Manufacturer: TBD
- Type: TBD
- Weights: TBD

04.09 Propeller Installation

The propeller shall be a variable-pitch prop. The gearbox will be sized to have a maximum of 909 shaft RPM with a 900 mm diameter propeller. The propeller tip clearance will be maintained at a minimum of 20% of the propeller diameter.

Line centers will be provided for each propeller.

System quotation information is attached.

- Manufacturer: West-Mekun (supplied by Amarteck)
- Type: 80 BHWS
- Propeller: 4 blade dia TBD
- Designed operating pitch: TBD
- Shaft diameter: 80 mm
- Shaft length: 4000 – 5000 mm estimated
- Propeller material: NiAlBr.
- Shaft material: 1.4460
- Pitch control: Lewmar Commander HPU controlled

04.10 Shaft System

The shaft system is to be provided by the pitch system supplier. The propeller shaft provided with a Profiseal, or equal and standby shaft seal.

Collision protection will be provided for the shaft system.

04.11 Exhaust System

The main engine exhaust to consist of a by-pass, water drop system as specified by Soundwave Corporation. The exhaust by-pass will exit above the waterline with the main exhaust exiting below the waterline. Both silencers will be fitted with water drops and drain lines if appropriate.

The exhaust system will be provided with all the necessary appendages, stiff mounts, surge absorbers and silencers for optimal results including taps to measure temperature and backpressure.

- * Kitter
- * Material
- * Weight
- * Silencer
- * Model
- * Horse
- * Ball valves
- * Material Exhaust
- * TB11
- * TB12
- * Soundwave
- * ED19 x 32Q water drop
- * Triangular Red Stripe
- * Type, AK1

05. GENERATOR05.01 General

The Builder, with approval by the Architect will confirm the final generator specifications pending final load analysis before construction.

The engines will be IMO MARPOL Annex VI compliant and arranged in accordance with Class requirements.

The Builder will consult with a noise and vibration consultant to ensure that the entire generator package (engine, sound shield, mounts and exhaust system) are optimum for noise and vibration control.

Primary electrical service will be 208 volts, 3 phase, 60 Hz.

05.02 Generator Sets

The generator installation will utilize three (3) identical generators with electronic control which are to be integrated with an automatic power management system as provided with the electrical panels.

Due to the space requirements the two generators mounted in the port engine room, will be mounted in a single custom enclosure.

05.02.01 Generators:

• Manufacturer:	Northern Lights
• Type:	MS66AD
• Rated:	40 kW (60 Hz, 1800 rpm)
• Weight:	847 kg (dry)
• Sound Shield:	Northern Lights
• Sound shield weight:	285 kg
• Sound shield dimensions:	2054L x 965W x 1159 H

05.03 Equipment on Generator Sets

The generators will be provided with the following equipment:

- Raw water pump for cooling
- Wet exhaust elbow
- 24 volt isolated ground system
- 24 VDC starting system
- 24 VDC electric gauges
- Electric shutoffs for Oil press, Water temp and over-speed
- Oil level gauge and sender
- Solenoid shutoff
- Paralleling kit
- Cupro-nickel heat exchanger
- Lube oil cooler
- Connections to oil change system
- Fuel filter and water separator
- Digital tachometer

- Double wall fuel lines and drains
- Resilient mount system as specified by Silent Line B.V.
- Spare parts kit; 1 total

05.04 Instruments and Controls

The generator sets are to be controlled at the electrical panels constructed by Atlas Marine Systems with an automatic starting & paralleling function.

The engines and electrical system and their alarms are to be monitored by the vessel monitoring system and also by gauges mounted at the generators.

05.05 Exhaust System

The generator exhaust systems are to consist of the components specified by Soundown Corporation. The exhaust systems will a water drop system with gas exit above the waterline. The low points and silencers will be fitted with a drain. The overhead silencer will be fitted with water drop.

The exhaust system will be provided with all the necessary appendages, soft mounts, compensators and silencers for optimal results including taps to measure temperature and backpressure.

06 THRUUSTER INSTALLATION06.01 General

The vessel will be provided with retractable bow and stern thrusters, located as per the drawing T_13. The thrusters will be controlled from both the port and stbd flybridge steering stations.

The port thruster(s) will be powered by the port main engine PTO hydraulic pump(s) and be independent of the starboard side thrusters. Likewise, the stbd side thruster(s) will be independent of the port side thrusters, be powered by the stbd main engine PTO hydraulic pump(s). Pending final location of the hydraulic power pack for the sailing systems, one thruster system will share a common reservoir with the Lewmar Commander HPU.

The Builder, with approval by the Architect and Project Manager will confirm the final thruster specification prior to construction of the vessel.

06.02 Thrusters

The four (4) thrusters will be retractable:

- Manufacturer: Lewmar
- Model forward: 500 SVTAH
- Power: 275 hp
- Weight: 310 kg each
- Model aft: 400 SVTAH
- Power: 260 hp
- Finish: Aluminum
- Weight: 230 kg each

06.03 Controls

Main activation will be centralized from the flybridge stbd helm station. Each maneuvering station will be provided with control stations.
See also Steering for third control.

All thrusters will have variable power, full-follow-up control and have independent operation between bow and stern.

06.05 Porter Supply

The port side thrusters will be powered by port main engine driven PTO pumps. Likewise, the stbd side thrusters will be powered by the stbd main engine driven PTO pumps.

The Builder shall assure that the pressure and flow requirements are consistent with the required power:

- Manufacturer: TBD
- Number: X
- Specification: Size 120
- Weight: X
- Port reservoir: X
- Stbd reservoir: X

06.06 Filtering

In-line filtering will be provided for each hydraulic reservoir as provided in the Hydraulic section.

07A ANCHOR SYSTEM

The ground tackle is to meet Bureau Veritas Rules Nr 381 Section 53 Part III. The preliminary Equipment Number is 243. The Builder is to confirm the Equipment Number and size of the equipments with Class.

The anchors and chain handling systems are to be installed in well decks under the forward deck and fit with flush hatches. The windlasses will sit over the chain suckers of the hulls with 90° rollers to lead to the anchors at the centerline. Compression type chain stops will be provided. While at anchor, the vessel will lay on a bridle system attached to the forward beam ends.

The Builder will mock-up the anchor handling arrangements to assure function of the system.

07A.01 Anchor Winches**07A.01.01 Primary Winches**

Two (2) hydraulic anchor winches with strain gypsies (only) will be installed in recessed foredeck wells with hatches. The windlasses will not have capstans. Controls will be on the foredeck only. The windlasses are to be reversing. The Builder will assure that the windlasses are capable of handling the anchor and chain.

- Manufacturer: Muir
- Type: VRC 11000
- Weight: 275 kg
- Power: Hydraulic
- Flow: 53 lpm @ 175 bar

07A.01.02 Chain Equipment

Chain compressor stoppers are to be provided and are to be of like quality to the anchor windlasses.

07A.02 Chain Lockers

Two (2) reinforced chain lockers with chain pipes are to be fabricated inboard on each hull as per the drawing: 702_Anchoring Arrangement. The lockers are accessed via side hatches within the hull and provided with drains in the lower corners.

The chain lockers are to be lined with a replaceable and sacrificial protective lining.

There will be a quick release pin or link at the bitter end to release the rode in event of emergency. This pin will be accessed without opening the chain locker.

07A.03 Anchors**07A.03.01 Primary Anchors**

- Manufacturer: Manson or equal
- Number: Two (2)
- Type: Plough; High Holding Power
- Weight: 412 kg
- Material: Bead blasted stainless steel

- Certification: BV Class or type approval

07A.03.02 Third Anchor

A third anchor will be carried in the dive locker with rode stowed on a reel.

- Manufacturer: Forrester
- Weight: 6X-115

07A.04 Chafes

For the primary anchors:

- Manufacturer: Hometaler or equal
- Material: Stainless steel
- Chain size: 20.5 mm stud link
- Grade: Q2
- Length each rode: 150 m (492') per anchor
- Certification: BV Class or type approval

For the third anchor:

- 25' 1/2" SS Proof coil chain x 300' 1 1/4" nylon rode

07A.05 Chain Wash System

The chain wash system will operate from the fire main system. In addition, there will be a fresh water system hose in the foredeck locker.

07B BILGE & FIRE PUMP SYSTEM**07B.01 General**

The bilge and fire pump system is to comply with Class requirements.

The piping systems are to be designed for maximum life cycle. Thus, we have selected 90/10 Copper Nickel as the hullsides piping material.

The bilge pumping system will consist of eight (8) independent pumps, one in each compartment. The bow compartment (forward of collision bulkhead) will drain into the bow locker compartment by a manually operated valve with reach red to the upper level of the bow locker. Emergency pumps will consist of engine driven pumps or the fire pumps with engine room suction. Pumps are to be located in a way to minimize standing water.

The fire main will consist of two independent pumps, one located in each engine room.

The vessel will also be provided with independent engine room FM-200 fixed fire fighting systems. Schematics of the bilge and fire systems and operation procedures shall be posted at each operating area.

07B.01.02 Hull Watertight Compartments

Each hull is divided into five (5) watertight compartments;

- Forepeak
- Forward cabins
- Machinery space
- Aft cabins
- Luzzarone

07B.02 Bilge Alarms

Each compartment will be fitted with a High / High-High bilge water alarm connected to the mimic panel. The operating system will be provided for within the vessel monitor and mimic system. The pumps will be manually operated.

- Level Alarm Manufacturer: GEMS
- Type: LS-240-3
- Number: 10

07B.03 Pumps**07B.03.01 Bilge Pumps**

- Manufacturer: Grundfos
- Number: 8 (eight)
- Type: Series 11 11-75
- Rating: 63 gpm @ 7.9 m head
- Power: 3/4 hp; 208/60
- Weight:

07B.03.02 Fire Pumps

The fire pumps will be titanium, vertical centrifugal pump as follows:

- Manufacturer: Grundfos
- Number: 2 (two)
- Type: CRT 16-30
- Rating: 14.75 m³/hr @ 54.85 M (65gpm@180ft)
- Power: 7.5HP motor, 208/3ph/60hz
- Weight: 63.3 kg

07B.03.03 Emergency Bilge Pump

A portable pump will be provided, in accordance with the Rules.

- Type: Grundfos
- Model: Series B BF 75

07B.04 Piping

All piping is to be metallic within the machinery space. Bilge piping outside of the engine rooms, where permitted by the Rules, will be plastic or composite. All fire main piping will be metallic with remote operated isolation valve at each engine room bulkhead as required.

As noted in 07A, the anchor wash system will be provided by a piping connection to the fire main system.

An international shore connection will not be provided.

07B.04.01 All Engine Room & Fire Main Piping

- Manufacturer: Yard choice
- Alloy: 90/10 Cu/Ni
- Standards: Class 200, ASTM B466
- Working pressure: 13.7 bar (200 psi)

Note the larger diameter from the sfd fire pump to the anchor wash section. This diameter is larger as this pipe section will be highly used and the purpose is to minimize water velocity (impingement corrosion).

07B.04.02 Bilge Piping Outside Engine Room

- Manufacturer: Yard choice
- Type: Aluminum or ASTM B466 ABS Plastic as appropriate

07B.05 Hoses and Nozzles

Hoses, hose storage and nozzles will as specified in 07E.04

07B.06 Oily Water Separator

An oily water separator will be provided for each engine room as required by the Rules. The separator will discharge to the slop tank.

- Manufacturer: Coffin World Water Systems
- Type: Meli-Sep 1000-QCD
- Power: .45 kW; 120/1/60
- Weight: 144 kg
- Dimensions: 785 L x 560 D x 1220 H

07B.07 Controls & Monitors

Controls and monitors will be provided as required by the Rules.

Bilge pumping will be provided remote operation from the salon locker station.

Fire pumps will be activated from any control station. Each fire pump unit will be provided with discharge pressure gauges with remote display to the monitor system.

07C SEA WATER SYSTEM

The installation of the sea water system should meet the Class Rules.

The piping systems are to be designed for maximum life cycle. Thus, we have selected 90/10 Copper Nickel as the metallic piping material. If the Builder proposes a different material, the cost difference and life cycle design will be provided.

07C.01 Sea Chests

There will be two integral, vented sea chests in each engine room, fitted with hull screens and sea valves as per the drawings and schematics.

07C.02 Sea Strainers

Sea Strainers will be fitted to the hull valves. All strainers will be provided with a blow-back connection from the compressed air system and vent pipes.

- Manufacturer: GlenTech or equal
- Type: Simplex with hinged cover
- Model: 320 - 4"
- Material: 90/10 CuNi body with 30/70 CuNi (monel) basket

07C.03 Hull Valves

Hull valves are to be butterfly valves. Materials are to be the best properties for life cycle and resistance to corrosion.

- Manufacturer: Keystone
- Type: Butterfly; lug type
- Diameter: 4"
- Body Material: Nickel aluminum bronze or iron
- Stem Material: 316
- Disc Material: A18c

07C.04 Piping

The builder will use the following guidelines for the piping system:

- All seawater piping and valve arrangements are to be in accordance with Class Rules.
- Flexible connections to pumps and machinery to isolate vibrations will be provided.
- Where possible, isolation or flexible connections should be made with factory hose and fittings or bellows sections. The use of hose clamps will be minimized.
- Metallic piping will be provided to all distribution valves connected to the sea chest and overboard discharges. Where permitted by the Rules, thermoplastic pipe is to be used for branch systems to air conditioning, water makers and auxiliary systems.
- Fluid velocities are not to exceed 3.6 m/s (12 ft/s)
- Piping system to be function tested in accordance with BV Rules for the Classification of steel ships, Class E, Chapter 21, Section 3. The maximum test pressure to be 1.5 times the working pressure.
- Sealant mesh holes to be a maximum of 3 mm (1/8")
- Spindles of sea suction valves and discharge valves below the head line are to extend above the floor plates or by other means be easily accessible.

- All pipe work is seamless 90/10 cupro-nickel or MIL-T-16420 Class 200 unless noted otherwise.
- All pipe sizes specified in the schematics are nominal bore in inches & class or schedule.
- All pipe connections to be 90/10 class 200 cupro-nickel but welded fittings unless pipe section is required to be removed for maintenance.
- All pipe connections in removable segments to be ANSI 150 flanges or as noted.
- All pipe work to be adequately protected and supported.
- All flexible hoses and bellows are to be RV type approval.
- All sea water piping shall be marked with the name describing the system.

07C.04.01 Metallic Piping

- Manufacturer: Yard choice
- Alloy: Copper Nickel 90/10
- Standards: MIL-T-16420 Class 200, ASTM B466
- Working pressure: 13.7 bar minimum

07C.04.02 Thermoplastic Pipe

- Manufacturer: Georg Fischer or other
- Type: ABS plastic or Beta Polypro (thermoplastic)
- Standards: DIN 8077/8078 type I
- Working pressure: 13.7 bar minimum

07C.05 Water Makers

See 07B Freshwater Systems.

07D FRESH WATER SYSTEM

The fresh water system will comply with Class Rules as applicable and the World Health Organization and US Public Health standards for water quality.

If the Builder proposes alternative equipment and piping systems, the Builder will provide cost and weight differences.

07D.01 Fresh Water Tanks

There will be two (2) freshwater tanks located in the center hull. Total capacity will be approximately 8600 liters. Tanks will be internally coated with a Ceramkote paint system.

07D.02 Fresh Water Pumps

Two (2) fresh water pumps will be mounted, one in each water tank. The pumps will be provided with the Headquarter control panel.

- Manufacturer: SUBPAQ
- Number: two (2)
- Model: SPX-227A-230
- Rating: 91 lpm @ 2.7 bar (24 gpm @ 40 psf)
- Power: 4.9 amps @ 208/3/60
- Dimensions: X
- Weight: 8 kg

Control Panel:

- Manufacturer: SUBPAQ
- Number: one (1)
- Model: CU-300
- Dimensions: X
- Weight: _ kg

07D.03 Water Heating System

The vessel will be supplied with two (2) water heaters, one located in each hull.

The Builder will propose utilizing a waste heat recovery system from the generator closed cooling systems.

A re-circulation system will be fitted in the hot water delivery in each hull. The upper deck hot water supply will be from an electric, instant hot water heating element.

Hot water heaters:

- Manufacturer: Hubbell Heaters
- Number: two (2)
- Type: MH 50-5-SCSR
- Capacity: 50 gal (190 l)
- Power: dual 5 kW element

- Dimensions: TBD
- Weight: TBD

07D.04 Piping

All fresh water piping to be an ABS plastic, or equal system. All hot water piping will be insulated to protect against heat loss and prevent sweating.

- Manufacturer: Yard choice
- Type: ABS
- Working pressure: 13.7 bar (200 psi)

07D.05 Accessories

Mixtures and fixtures for guest, officer cabins and luxury areas are detailed in Part 12 Exterior Concepts, and include:

Area	H/C sink	H/C shower	Toilet	H/C tap	Cold hose bib
Owner's suite:	x	x	x		
VIP cabin:	x	x	x		
Fwd guest:	x	x	x		
Mid guest:	x	x	x		
Aft guest:	x	x	x		
#1 crew:	x	x	x		
Laundry:	x			3	
Galley:	2			3	
#2 crew:	x	x	x		
#3 crew:	x	x	x		
Capt cabin:	x	x	x		
Port eng room:				x	x
Starb eng room:				x	x
Salon bar:	x				
Flybridge bar:				Cold only	x
Foredeck locker:					x
Main aft deck:					x
Port lazarette:					x
Starb lazarette:					x
Port transom:		x			
Starb transom:		x			

Notes:

1. Hose connections will be concealed in lockers with the ability for hose connection to be made with the locker closed (hose lip in hatch cover).
2. Transom shower details to be decided with Owner's Representative.
3. Whether listed or not, the Builder will provide required hook-ups for all applications.

07D.06 Water Filter

One water filter will be mounted at the discharge of the water pumps.

- Manufacturer: Headhunter
- Type: HHP-7304L

- Weight: 15 kg (dry); 36 kg (wet)
- Dimensions:

07D.07 UV Sterilizer

A UV sterilizer will be mounted at the discharge of the water filter.

- Manufacturer: Headhunter
- Type: UV-40
- Power: 140 watts @ 208/1/60
- Weight: 16 kg (dry); 22 kg (wet)
- Dimensions: X

07D.08 Tank Filling

The tank fills are to be located on the side deck in the fuel tank fill lockers. The fills will be closed with a screw cap and be 22 mm ID.

07D.09 Water Makers

There will be two (2) water makers, located in one engine room, installed with proper connections to electrical supply, water intake, cleaning system, product distribution and brine discharge.

- Manufacturer: Sea Recovery
- Model: AWF 1800-2
- Capacity (each): 6814 lpd (1800 gpd); 284 lph (75 gph)
- Power: FLA: 3 @ 208/3/60
- Dimensions: 645 w x 508 d x 432 h
- Weight: 77 kg each

The units are to be fitted with all necessary components per manufacturers' standard supply. Optional equipment is to include:

- Fresh water flush
- Media Filter assembly
- Soft motor start
- Clean rinse panel
- UV sterilizer
- pH neutralizing filter
- Chemical rinse

07E. FIRE FIGHTING SYSTEM

The fire fighting inventory will comply with Class and MCA Large Yacht Code (LY2), as appropriate to the vessel and its equipment.

07E.01. Fire Detection System

The fire detection system is to comply with Class and MCA requirements. Fire and smoke detectors are to be fitted in each separate zone, with audio/visual alarm and display panel on the main panel and other areas as required by regulations.

- Manufacturer: DMP or Consilium Marine (?)
- Type: CS492
- Detectors: As required by the Rules

07E.02. Sea Water Fire System

A fixed fire main system with three (3) fire stations with combination nozzles and hoses is served by two independently driven fire pumps located in each engine compartment as specified in section 07B of this specification.

Hydrants are to be aft connection type, fitted with boxes on stainless steel racks, the size and quantity as required by the regulations.

The number of hoses with nozzles required shall be provided to the satisfaction of the Administration.

Fire stations are listed in part 07B Fire & Bilge System and Schematic and are as follows:

Station	Location
1	Main aft deck
2	Main forward deck
3	Upper deck

07E.04. Sea Water Fire Stations

The fire stations will be provided with the following equipment:

- Manufacturer: Powhatan or Astor
- Type: 02-464 1½"
- Length: 18 to (59") maximum
- Diameter: 45 mm hose
- Nozzles: 19 mm jet/spray
12 mm jet/spray for interior areas

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07E.05 Engine Room Fixed Fire-Fighting Systems

The vessel will be fitted with independent fire fighting systems for each engine room. The each engine room will be arranged with independent automatic fuel, air and engine shut-downs, with manual stops as required by the regulations or system manufacturer.

- Manufacturer: Sea-Fire
- Type: FM-200
- Capacity: 51 m³ (1800 ft³) each compartment
- Unit Weight: 136 kg

07E.06 Portable Fire Extinguishers

Accommodation, service and machinery shall be provided with portable fire extinguishers of appropriate types and in sufficient number to the satisfaction of the Administration.

The locations are to be listed and described in the 'Fire & Escape Plan'.

Preliminary inventory:

Location	Quantity	Type	Model
Upper deck at bar	1	FM-200	C-20
Salon	1	FM-200	C-50
Owner's suite	1	FM-200	C-20
VIP suite	1	FM-200	C-20
Laundry	1	FM-200	C-50
Galley	1	FM-200	C-100
	2 Fire blanket		
Crew quarters aft	1	FM-200	C-50
Port Engine room	2	FM-200	C-180; C-20
Starboard Engine room	2	FM-200	C-180; C-20
Port Cabin forward	1	FM-200	C-30
Port cabins aft	1	FM-200	C-20
Port lazette	1	FM-200	C-20
Starboard lazette	1	FM-200	C-20
TOTAL	15 fire extinguishers		

07F PNEUMATIC SYSTEMS

There will be two independent pneumatic systems on board, one for the dive compressor system and one for the horn installation. In addition, there will be an emergency cross-over between the air horn receiver and dive compressor system.

- Air horn system
- Dive compressor systems
- Distribution piping

07F.01 Air Horn

The air horn will be a Kaldenberg supplied system.

- | | |
|--------------------|--------------------------------|
| • Manufacturer: | Kaldenberg |
| • Model: | T-2 |
| • Horn Controller: | M-311A |
| • Remote stations: | (2) M-131A |
| • Compressor: | Kaldenberg |
| • Model: | KA2000 Oil-less |
| • Power: | .9 kW 208/1/60 |
| • Delivery: | FAD @ 8 bar: 83 lpm (3.11 cfm) |
| • Air Receiver: | M-188 |
| • Capacity: | 4.63 m ³ (19.7 gal) |
| • Total Weight: | 50 kg |

07F.02 General Pneumatic System

A general pneumatic system will be provided with air distribution system located to all technical areas of the vessel. The air supply will come from the air horn receiver. Hoses connections will be by Parker quick connect fittings. Air delivery locations:

- Upper deck locker
- Foredeck locker
- Port engine room
- Starboard engine room
- Port lazarette
- Starboard lazarette
- Cross over alley

07F.03 Diving Air Systems

The dive air systems will be supplied by the Builder and is to be as specified by the Owner's Representative.

07G WASTE WATER TREATMENT SYSTEM

The waste water treatment system will comply with MARPOL Annex V and 33 CFR 151 regulations.

The concept of the waste water treatment systems are as follows. Please see the attached schematics for layout.

- In each hull, black water will be collected in two receiving tanks (one fwd, one aft) and transferred to a holding tank in the keel. From the holding tank, the treatment system will treat waste before discharge. The holding tank can also direct discharge overboard or to a deck pump out station.
- In each hull, gray water will be a gravity system, collected in two receiving pump units and transferred to the holding tanks in each respective hull. The holding tank can also direct discharge overboard, to the other hull or to a deck pump out station.

07G.01 Piping System

The waste water systems are to be installed according to the schematics. Requirements are as follows:

- The slope on gravity drains is to be a minimum of 1:96
- Piping to be in accordance with BV 2003 Rules, Part E, chapter 21, section 3
- Test pressure to 3 bar
- All piping to have solvent welded joints unless connected to equipment or providing for service access.
- All drains will be provided with vent traps.

Piping System will be:

- Type: ABS
- Schedule: 40
- Connections: Solvent weld or
Socket union

07G.02 Sump Pumps

Sump pumps will be isolated from the hull and provide transfer of gray water. Each pump will have a level sensor and control system for transfer to the holding tank.

- Manufacturer: HeadHunter
- Model: Chirack CHK-AC
- Number: Four (4)
- Capacity: 166 lpm
- Power: 3.5 amp @ 208/60/1
- Weight: 14 kg

07G.02.02 Sump Tank Pump Control

The sump pumps are to be fitted with both automatic and manual switch control from the vessel's control and transfer system.

07G.03 Galley Sink System

The galley sink drains will be provided with a macerator and grease containment system. The macerators will be located at the sink. The grease grouper will be mounted in the sink engine room with easy access for cleaning.

- Manufacturer: Headhunter Greasegrouter
- Model: GG13.5
- Power: 20 amps @ 120/60
- Weight: 10 kg (22 lb)

Macerator:

- Manufacturer: TBI
- Model: TSD
- Power: 2 amps @ 120/60
- Weight: 10 kg (22 lb)

07G.03 Toilet System

The toilet system will be a jet flush system, supplied by the pressure fresh water system.

- Manufacturer: Headhunter
- Number: Ten (10)
- Type: RFA-02/Aero Wall Mounted
- Flush units: AX-24
- Weight: 25.4 kg

Note: the owner's suite and VIP suite will have the bidet accessory provided.

07G.06 Black Water System

Each hull will have non-integral black water collection tanks as per the drawings. The tanks will be provided with linear blowers for pre-treatment and aeration. The collection tanks will transfer to the holding tank prior to the treatment system.

Control systems and monitors will be supplied by Headhunter.

The Builder will be responsible for:

- Proper flow of waste water
- Supply of non-integral tanks
- Internal coating of all tanks with Ceramkote

07G.07 Waste Treatment System

Each hull will have independent waste water treatment systems.

- Manufacturer: Headhunter
- Type: Tidut Wave
- Model: TW-50LP
- Dimensions: 18" high x 12" deep x 48" long
- Power: 4.8 amps @ 208/1/60
- Weight budget: 82 kg dry, 264 kg operating

017.07 Waste Water Pumps

Black/Gray water discharge pumps:

- Manufacturer: Headhunter/Grundfos
- Model: EF 75
- Number: Four (4)
- Power: 3/4 hp @ 208/1/60
- Weight: TBD

Black water transfer pumps:

- Manufacturer: Headhunter
- Model: Mako M1-230
- Number: Four (4)
- Power: 3.2 amps @ 208/1/60
- Weight: 20 kg.

Black water peration pumps:

- Manufacturer: Headhunter
- Model: BLR L80-230
- Number: Four (4)
- Power: 0.25 amps @ 208/1/60
- Weight: TBD
- Diffuser: QDHF-24

07H HYDRAULIC SYSTEMS07H.01 General

The yacht will be outfitted with four (4) independent hydraulic systems. For design purposes, we have divided the systems in groups as follows:

- | | |
|-----------------------------|---------|
| • Port hull thruster system | Group 1 |
| • Stbd hull thruster system | Group 2 |
| • Main hydraulic system | Group 3 |
| • Steering system | Group 4 |

Groups 1 & 2, thruster systems, will be independent in each hull, i.e.: Group 1, the port main engine will drive the port side thrusters and Group 2, the stbd main engine, will drive the stbd side thrusters.

As indicated in part 04 Main Engines and part 06 Thrusters, the thruster systems will be designed to operate with the engines in a 'maneuvering' mode. The engines will run at a constant rpm with deadweight maneuvering provided by the variable pitch propeller control. The purpose of this method is that the operator will be able to provide sufficient thruster and engine power without needing to (dis)engage the gear box.

Group 3, the main hydraulic system, will be a load sensing system, powered by the generators, consisting of a custom power pack located in the port engine room. The exact configuration is to be determined.

The steering system will not be discussed further in this section. Please refer to part 3 Steering Systems for information. However, all system engineering, part 07H.02, is applicable.

All power ratings are provisional pending final design requirements.

As applicable, control functions will be mounted adjacent to the given service, with easy access and visual contact if operated manually.

The Builder may propose alternative equipment and design that will decrease the system weights, improve efficiency and life cycle of the equipment.

07H.02 Group Functions07H.02.01 Group 1

Group 1 will be powered by the port main engine with control valves located forward of the engine for:

- Port bow thruster
- Port stern thruster

07H.02.02 Group 2

Group 2 will be powered by the stbd main engine with control valves located forward of the engine for:

- Stbd bow thruster

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- Stbd stern thruster

07FE.02.03 Group 3

Group 3 will be powered by the main hydraulic pack located in the port engine room. Main feed and return lines will be run to the respective local control valves and blocks as per the schematic.

- Foreward distribution will be from the fore deck anchor locker area:
 - Port windlass
 - Stbd windlass
 - Port mooring and spinnaker winch
 - Stbd mooring and spinnaker winch
 - Genaker furler
 - Inner headsail furler
 - Outer headsail furler
 - All mast hydraulics
 - Main halyard winch
 - Mast winch 1
 - Mast winch 2
- Upper deck distribution will be from upper deck technical space:
 - Genoa captive reel port
 - Genoa captive reel stbd
 - Staysail captive reel port
 - Staysail captive reel stbd
 - Main sail traveler
 - Port genaker winch
 - Stbd genaker winch
- Aft distribution will be from each lazarette area:
 - Stbd hull side door
 - Aft stbd mooring capstan
 - Stbd lazarette tender beam
 - Port transom pumelle
 - Port transom platform
 - Port transom step door
 - Aft port mooring capstan
 - Main hull tender doors

07FE.02 Hydraulic Controls & Monitoring07FE.02.01 Groups 1 & 2

Groups 1 & 2 will operate independently of each other. Each group will be activated from the main bridge station with full operating control from the main bridge and both flybridge helm stations.

The thrusters systems will be monitored on the vessel monitoring and alarm system. The monitor functions are:

- Oil temperature*
- High oil temperature, Alarm*
- Low oil level alarm, Warning*

- System pressure

Engine room monitors and gauges, port and starboard:

- Pressure filter clogging indicator
- Return filter clogging indicator
- Pressure: visual indication at the pumps and at external console positions
- Note: Due to the common oil reservoir, Group 1 monitors are common with Group 3 monitors

0211.02.02 Group 3

The main power pack will be a Load Sensing system. With this type of system, a pump will deliver the amount of oil required by that particular valve, with the added feature that a number of services can be met at any one time, from one or more pumps as the demand requires.

The pump controller will rotate the three pumps in service between primary and stand-by service.

There will be an emergency stop mounted at each external helm station for the sailing functions.

The main hydraulic power pack will be monitored on the vessel monitoring system. The monitor functions are:

- Oil temperature
- High oil temperature, Alarm
- Low oil level alarm, Warning
- System pressure
- Low system pressure, Alarm

Local monitors and gauges:

- Pressure filter clogging indicator
- Return filter clogging indicator
- Pressure: visual indication at the pumps and at external console positions

0211.03 Power Supplies

The following power supplies will operate the hydraulic systems.

The Builder will design and supply the hydraulic oil cooling systems.

0211.03.01 Group 1 & 2 Thruster Power Supplies

The main engines will drive a single pump or set of tandem pumps for the bow and stern thrusters. The pumps will be fitted with remote activated clutches.

- Manufacturer: TBD
- Number: TBD
- Type: TBD
- Power: TBD
- Operating pressure: TBD

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- * Flow rate: TBD
- * Weight: TBD
- * Dimensions: TBD

0711.03.02 Group 3: Main Power Pack

One triple motor, custom power pack will be provided for the main hydraulic system.

- * Manufacturer: Lewmar
- * Type: Custom Commander 10+10+200
- * Operation: Load Sensing
- * Power: 3 x 9 kW (estimated)
- * Operating pressure: 140 bar (2000 psi)
- * Flow rate: Variable
- * Weight: 300 kg Estimated
- * Dimensions: (semi-integral) hull tank with top mounted pumps)

0711.04.01 Hydraulic Oil Filtering System

In addition to the standard inline particle filters, the main power pack will be arranged with an off-line filter system. The system will have start/stop control manually by the engineer with alarms and pressure system stops as recommended by the manufacturer.

- * Manufacturer: CC Jeanen AS
- * Model: HDT 13/25 PV
- * Flow rate: 120 l/b
- * Power: 200/3/60; 1 kW
- * Dimensions: 425 h x 345 w x 240 d
- * Weight: 22 kg

0711.05 System Engineering

The Builder must carefully review the hydraulic system design for this yacht in order to provide the best solution for the high number of services required.

The Builder will calculate the final capacities of the reservoir tanks.

The system should be designed for:

- * Ease of maintenance
- * Flexibility
- * Safety
- * Reduce pipe work
- * Maximize life cycle of the components

0711.05.01 Mounting of Pumps, Valves & Components

- * All pumps to have flexible tails connecting to rigid pipe work.
- * The valve blocks and all other ancillary units relating to, or connected to pipe work shall be isolated to the structure for noise and vibration.
- * The 1st reservoir must be suitably isolated to the structure for noise and vibration.
- * All deck machinery such as winches, windlasses, etc. to be mounted on sound deadening material.

07H.05.02 Pipe Work & Mounting Brackets

All pipe work is to be stainless steel high pressure tubing. Tubing will be highly polished in areas where visible. Parts that cannot be obtained in stainless steel shall be properly coated with an application of epoxy paint. The manufacturer of the pipe supplier is to be agreed upon with the Owner's Representative before installation.

- Manufacturer: Builders supply
- Pipe standard: ASTM 269 or DIN 24131 as applicable
- Pipe fittings: Stainless steel compression fittings are to be used on all pipe work of 1" and below, the same manufacturer to be used throughout the vessel's hydraulic system.
- Correct pipe size to be selected to minimize turbulent flow
- All pipe runs to be kept as straight as possible
- Long radius elbows are to be used only unless there is no other solution.
- Piping is to be secured in brackets using UCC or RSB type rubber isolation.
- All watertight bulkhead penetrations are to be pipe sections (not hose).
- Bulkhead penetrations will be as specified in part 02.15 Watertight Penetrations
- Pipe clamp spacing is to be as follows:

<u>Pipe Size</u>	<u>Spacing</u>
< 10 mm	1000 mm or every frame, whichever ever is less
10 to 25 mm	1500 mm or every frame, whichever ever is less
> 25 mm	2000 mm or every other frame, whichever ever is less

07H.05.03 Hoses & Mounting Brackets

Hose installations are to be as follows:

- Flexible hose are to be specified having a minimum 4:1 safety factor.
- Flexible hose tails to be, in general, a maximum of 1.5 meter long.
- The ends to be of stainless unless otherwise stated.
- Hoses are to be R7 / R8 above deck with stainless swage ends.
- When flexible hoses are used, they must be shielded and/or secured at chafe points
- Hoses will be clamped at every frame spacing or chafe points
- Where there is a fire/hot potential in close proximity to a hose, a fire sleeve must be fitted.
- Flexible hose may be used when trying to hard pipe in confined areas, thus saving too many complicated bends.

0711.05.04 Noise Control

The hydraulic system will be designed for maximum noise control. Of primary importance is the operation of the Main Hydraulic System for Groups 3. The Builder will work with a noise and vibration specialist to minimize noise from the hydraulic system.

Fluid borne noise is the major problem and normally generated within the pump. Consultation will be considered for:

- Pump selection
- Select the correct size of pipe to reduce turbulent flow
- Minimize the number of pipe bends
- Use of the correct pipe clamp and location
- Use of reactive silencing
- Isolate mount all items in the system such as winches, piping, valve blocks and equipment.
- Always terminate rigid stainless steel pipes with flexible tails when above 16 mm in diameter. It is acceptable to rigid mount some of the smaller pipes below 16 mm.
- Use proper isolation mounts for equipment.

0711.06 Safety

- Emergency stop is to be provided at each Hydraulic helm station
- All equipment installed is to be operated within the stress limits laid down by the manufacturer.
- System is to be designed so that all components are easily accessible for adjustment and service.
- All valves with manual override facilities should be located within sight of the service being operated.
- No stop valves are to be fitted in return lines.

0711.07 Documentation

The vessel will be supplied with full technical documentation will be provided in separate binders and on CD; to include:

- Two (2) copies of manuals and service schedules
- Two (2) sets of drawings
- Pipe drawings
- Schedule of parts
- Service literature on each pump, valve, filter, etc
- Basic service instructions
- Electronic control circuit
- Hydraulic deck machinery data

0711.08 Testing and Commissioning

- A full test and commissioning program will be proposed by the Builder for the approval of the Owner's Representative.

071 FUEL SYSTEM

There will be a total of six (6) integral aluminum fuel tanks, including the service tank, located as per the drawing: T07 Tanks Position & Geometry. The tanks will be located in the midships sections of the wet deck. Tank capacities to be displayed on the transfer system. The tanks will be constructed and provided with fills, vents and service connections in accordance with Class Rules and MCA requirements. The fuel system will be arranged according to the drawing: S_03 Fuel System Schematic.

The fuel fill and transfer system will be installed in the tank space for control of filling and transfer operations. Filling will be from the port and starboard deck lockers with remote actuated fill valves, directing fuel to individual tanks. The fuel transfer system will utilize remote actuated suction valves and discharge via the fill valves.

The fuel supply system for each engine room will draw fuel from a single service tank, located in the tank compartment. Each engine room will have remote stop valves on both the supply and return lines.

The fuel purifying system will be mounted in the starboard engine room. The system will draw fuel from any tank and discharge to any tank.

Fuel delivered to each engine room will have a booster pump mounted in parallel for priming of engines and filters. There will be a fuel conditioner installed to each engine room supply. Individual filters will be installed for each engine.

071.01 Storage Tanks

Each storage tank and the service tank will be provided with:

- Each with its own electronic level indicator.
- Each with its own magnetic level indicator.
- Each tank with piping connections as per drawing: S_03 Fuel System Schematic.
- Locking plugs.
- Top mounted manholes clear of any permanent equipment or pipe installations.

071.02 Transfer Pumps

Two (2) bronze gear fuel transfer pumps will be installed in the tank space, as per the schematic.

- | | |
|-----------------|---|
| • Manufacturer: | Oberdorfer |
| • Type: | OB-N970H-S3-30F18BCT-ER |
| • Power: | 1.5 hp; 208/3/60 |
| • Motor class: | TEFC, TEFA5 |
| • Flow: | 4360 gph @ 2.75 bar (19.2 gpm @ 40 psi) |
| • Weight: | 24 kg |

071.03 Fuel Purifier

One (1) fuel centrifuge system will be installed in the sub engine room as per the schematics.

- Manufacturer: CC Jensen
- Model: PTU 27/27 F-EW
- Power: 208/3/60
- Performance: 1 gpm
- Weight: 78 kg (dry)

071.04 Fuel Priming pumps

One (1) fuel priming pump will be installed in each engine room as per the schematics.

- Manufacturer: Walbro
- Model: 6806
- Power: 1 amp, 24 VDC
- Performance: 7500 gph @ 27.5 bar (33 gpm @ 4 psi)
- Weight: 3 kg

071.05 Piping & Valves

The Builder will use the following guidelines for the installation of the fuel system:

- All tube to be seamless annealed stainless steel grade 316L to ASTM A269 standards.
- All stainless steel piping and fittings are to be bead blasted finished.
- All pipe sizes specified are OD.
- Flexible pipe couplings and their installation are to comply with the requirements of NFPA Rules.
- All pipe connections are to be 316 grade stainless steel butt welded fittings unless pipe section is required to be removed for maintenance or attached to equipment.
- All fittings in removable sections are to be Swagelok or flanged manufactured from 316 grade stainless steel.
- All valves are to be of fire safe stainless steel construction to API 607
- All ball valves are to be of 3-part construction.
- Pneumatically operated valves will operate at 7 bar (100 psi).
- All pneumatically controlled valves are to be arranged for local manual operation. These valves are also to be provided with a means of indication of open and closed position at each control position. In addition, local indication of valve position is to be provided at the valve position where direct manual operation is required.
- Where fuel tanks are fitted with inlet or outlet pipes below the level of the associated overflow pipe, shut-off valves are to be located directly on the tank. Such pipes not longer than 1.5 of the pipe diameter, between the tank and the valve, may be accepted.
- Pipe work will be color coded and marked with the description, i.e.: Diesel supply, Diesel return, etc.

071.06 Fuel Conditioners

Magnetic fuel conditioners will be installed in each engine room supply line so as to serve all engines.

- Manufacturer: Algac-X or equal
- Series: LGX-1500
- Port size: 3/4"

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- Flow rate: 350 gph
- Weight: 9 kg

#7147 Fuel Filters

The fuel filters will be provided as follows:

Engine:	Generator	Main Engine
Filter Model:	560 MAX-P	759K0 MAX-P
Number of:	3	3
Filter Element	2 micron	2 micron
Height	392	432
Width	147	476
Depth	122	279
Weight	1.7	10.4

07J LUBE OIL SYSTEM

Independent lube oil systems will be installed in each hull. Each system will consist of a dirty oil tank and a clean oil tank. Refer to the attached schematic: Lube Oil System schematic.

- An independent dirty oil pump will drain the engine sumps to the dirty oil tank and also discharge the dirty oil tank to deck.
- An independent clean oil pump with hose reel will provide clean oil for distribution.

07J.01 Clean Lube Oil Tank

The clean lube oil storage tanks will be 500 liters each, located as per the drawings.

The clean oil supply will be filled from the respective 60 lockers on the port and starboard decks.

07J.02 Dirty Lube Oil Tank

The dirty lube oil storage tanks will be 850 liters each, located forward of the engine room as per the drawings.

The dirty oil will be discharged by the dirty oil pump to the respective 60 lockers on the port and starboard decks.

The Builder will provide a 10 m hose with quick connect fitting to discharge the dirty oil ashore.

07J.03 Oil Pumps

The dirty oil pump will be used to empty the selected engine sump and discharge the dirty oil tank to deck using a 3-way valve system.

The clean oil pump supply the hose reel system. The hose reel system will provide oil to the engines via a metering nozzle.

Pumps will be provided with a pressure limit switch or relief valve to prevent over-pressure of piping and hoses.

• Supplier:	Depco
• Manufacturer:	Oberdorfer
• Number:	Four (4)
• Model:	OB-N9903-30N12BTC-W
• Power:	.75 kW/ 208/60/3
• Weight:	27.4 kg each

07J.04 Piping & Valves

The following shall apply to the delivery piping systems:

- All tubing to be seamless stainless steel 316L to ASTM A329 or equal.
- All fittings in removable sections are to be Swagelok or flanged manufactured from 316 grade stainless steel.
- Tubing bends will be long radius.

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- All valves are to be full bore ball valves
- Engine pump connections to be flexible Aeroquip FC234-52, SAE 31942 hose with bolt jackets in accordance with the Rules.

All valves will be full bore bronze valves.

- Manufacturer: Contraco, or equal
- Type: Full bore ball valves

07J.06 Oil Reel

An oil reel will be provided in each engine room for adding oil to the engines. The nozzle will be equipped with a metering device.

- Manufacturer: Reclomil
- Type: 5690 OLS
- Hose ID: 3/8"
- Hose Length: 30 feet
- Dimensions: TBD
- Weight: 10 kg (est)

Metering Nozzle:

- Manufacturer: Liquid Dynamics
- Type: BM-20
- Part No: 530109

07J.07 Tank Monitor System

Clean and dirty oil tank monitoring will be provided and will display on the vessel monitoring system.

The Builder will finalize specification details of the monitoring system.

Dirty Oil:

- Manufacturer: Headhunter
- Type: TSI
- Control Unit: SYMBQ
- Output signal: TBD

Clean Oil:

- Manufacturer: Gentec
- Type: Safe site vinyl alloy
- Control Unit: TBD
- Output signal: TBD

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07K BAD, GALLEY & LAUNDRY EQUIPMENT

At this time, a design consultant is reviewing the design, layouts and equipment for the galley and laundry. The following is provided as a preliminary list and data form of an initial proposal what was to the client's wishes.

07K.01 Convection oven

- Manufacturer: Gaggione
- Model: GB 388
- Dimensions: 850 x 560 x 475
- Power: 5,8 kW 2 NPEAC 400 V
- Weight: TBD

07K.02 Cook top

- Manufacturer: MKN Küchenmeister
- Model: 2 piece induction range with 2 zones @ 7 kW
1 induction wok @ 5 kW
1 griddle plate @ 7.2 kW
- Weight: 190 kg

07K.03 Comb. Oven

- Manufacturer: Haus Dampf
- Model: Gold 6 1/3 GN
- Power: 10,9 kW 3 NPEAC 440 V
- Weight: TBD

07K.04 Microwave

- Manufacturer: Panasonic
- Model: NE 1037
- Power: 13 amps

07K.05 Ice Maker

- Manufacturer: Scotsman Ice
- Model: ACS 125W
- Dimensions: 675 x 521 x 897
- Weight: 48 kg

07K.06 Under Counter Fridge

- Manufacturer: Foster
- Model: LR 150
- Power: 120V, 13amp
- Weight: TBD

07K.07 Under Counter Freezer

- Manufacturer: Foster
- Model: LR 140
- Power: 120V, 13amp

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- Weight: TBD

07K.08 Trash Compactor

- Manufacturer: InSinkerator
- Model: 8251S3
- Dimensions: 310 x 310 x 840
- Power: 120 VDC
- Weight: 61 kg

07K.09 Dish Washer

- Manufacturer: Miele
- Model: G7855 or 7859
- Dimensions: H 85cm, W 60cm, D 60cm
- Power: 9 A 3kW 380V AC 400V
- Weight: TBD

07K.11 Sink

All sinks are to be selected by the interior design or galley consultant. All sinks are to be fitted with waste disposal unit and drain to a Headhunter Grease Catcher system located in the cold engine room.

- Type: InSinkerator brand 3/4hp motor-continuous feed
Or Viking VCFW 1020-continuous feed model

07K.12 Washing Machines

There will be two washing machines. Washing machines will require remote liquid dispenser for detergent, due to the dryers being fitted above and blocking the regular fill drawers.

- Manufacturer: Miele professional 7.5kg
- Model: WS 5073-MC23
- Dimensions: H 102cm, W 73cm, D 71cm
- Power: 3 phase @ 8.5kw
- Weight: 147 kg

07K.13 Drying Machines

There will be two dryers.

- Manufacturer: Miele professional 7.5kg
- Model: T6185
- Dimensions: H 102cm, W 73cm, D 71.5cm
- Power: 3 phase @ 8.5kw
- Weight: 75 kg

07K.14 Rotary Iron

- Manufacturer: Miele

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- Model: HM 16-83
- Dimensions: H 96cm, W 105cm, D 38cm
- Power: 3 kW @ 208/60
- Weight: 38 kg

07K.15 Main Saloon Bar Equipment

The saloon bar will be arranged with the following equipment. Final design is to be determined by the interior designer.

07K.15.01 Ice Maker

- Manufacturer: Scotsman Ice
- Model: ACS 123W
- Dimensions: 675 x 523 x 897
- Weight: 48 kg

07K.15.02 Bar Fridge

- Manufacturer: Gambo, or equal
- Model: ECC/22GV5 with remote compressor
- Dimensions: 840 h x 516 w x 513 d
- Weight: TBD
- Capacity: Storage: x kg (x lb)

07K.15.03 Wine Cave

- Manufacturer: Euro Cave
- Model: S864T
- Dimensions: 874 h x 654 w x 698 d
- Weight: 48 kg

07K.15.04 Bar Glass Washer

- Manufacturer: Miele Professional
- Model: G7855
- Dimensions: 850 h x 600 w x 600 d
- Power: 3 kW ; 3 phase option
- Weight: 70 kg

07K.15.05 Bar Coffee Machine

- Manufacturer: Breville/De'Longhi
- Model: S9 automatic
- Dimensions: 356 h x 356 w x 387 d
- Power: 1250 W ; 120
- Weight: 11.8 kg

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07K.16 Fly Bridge Bar Equipment07K.16.01 Ice Maker

- Manufacturer: Scotsman Ice
- Model: ACS 175W
- Dimensions: 675 x 521 x 897
- Weight: 48 kg

Smaller option:

- Manufacturer: Scotsman Ice
- Model: HCM 45
- Power: 450 watts ; 230V/60
- Dimensions: 790 h x 457 w x 523 d
- Weight: 43 kg
- Production: 35 kg per day
- Storage: 15 kg

07K.16.02 Bar Fridge

- Manufacturer: Gunko, or equal
- Model: MG150G
- Dimensions: 840 h x 116 w x 513 d
- Power: 200/60
- Weight: 73D
- Capacity: 144 bottles

07K.16.03 Wine Cave

- Manufacturer: Euro Cave, or equal
- Model: S264T "Visionpack"
- Dimensions: 874 h x 654 w x 698 d
- Weight: 72 kg
- Capacity: 195 bottles

03 BUILT-IN REFRIGERATION AND FREEZER SYSTEMS**03.01 General**

In addition to the galley refrigerators, there will be a walk-in chilled room with freezer room inside, located at the forward end of the galley. The boxes are to be custom designed by the Builder and constructed in stainless steel, to utilize the available volume with consideration to other technical services in the area.

There will be a frozen garbage compartment located in the aft stbd hull below the crew deck. Construction details to be determined.

All refrigeration systems will be provided with dual independent compressor and evaporator systems for redundancy.

Other requirements as follows:

- The refrigeration systems will operate between 1.5 to 3.5°C (35 to 39° F).
- The freezer systems will operate between -13 to -18°C (+5 to 0° F).
- The chilled garbage systems will operate between -3.3 to -1.6°C (26 to 29° F).
- Dimensions are as per the General Arrangement drawings.
- High efficiency insulation will keep compressor sizes reduced.
- All units will be AC powered.
- All compressors will be located in stbd engine room with water cooled condensers.
- All boxes to have interior light.
- Freezer and garbage compartment door gaskets are to have heaters.
- All boxes to have drain plug with plumbed drain system and/or a means to clean and are to have heaters.
- All boxes to have individual temperature control with remote thermometers (C/F) for local display.
- All boxes to have individual shut-off switches when not in use.
- All boxes to have storage rack systems of food grade stainless steel.
- Temperatures will be monitored by the vessel monitoring system.

09 HEATING, VENTILATION & AIR CONDITIONING (HVAC)

Of primary importance to the Client is the quality of the HVAC systems. It is important that the system provide adequate cooling in all climates and that make-up air be sufficient for maximum air quality. In addition, the aft main deck will have provisions for enclosing a large area with enclosures, and this area is to be provided with fan coil cooling. The details, dimensions and volume of this area is to be finalized.

The ventilation systems are to comply with applicable Bureau Veritas Class Rules, as applicable. All vent and duct systems will be provided with necessary controls and air dampers and insulated for fire protection as required by the Rules. All intake vents will be insulated for thermal and fire protection as required and attention will be given for maximum sound dampening in all aspects of the installations.

We are presenting a preliminary proposal from AquaAir for a fan coil system with make-up and extraction air systems. Delta T has specified the engine room ventilation systems. The Builder may propose alternative equipment and arrangements provided it saves weight, cost and efficiency. The Owner's Representative will have final approval for alternative proposals.

09.01 Air Conditioning System Design

We have worked with AquaAir Marine Air Conditioning System, Hialeah, FL for the design and supply of the air conditioning systems for the vessel. The air conditioning system will be a chilled water, fan coil system.

The Builder will consult with the system supplier on the use of a ducted system for the upper deck salon, bridge and main salon.

The temperature in each compartment will be controlled by digital thermostats. Make-up air and extraction air will be from centralized units.

The yacht is intended for use in tropical and temperate climates and is to perform to the following conditions:

Design Conditions:	Summer	Outside	35°C @ 85% RH	95°F
		Inside	23°C @ 50% RH	73.5°F
		Seawater	30°C	86°F
Winter	Winter	Outside	10°C	41°F
		Inside	21°C	69°F
		Seawater	5°C	41°F

09.01.01 Chilled Water Pipe Systems

All chilled water distribution piping is to be a light weight system. Tubing design is to be in accordance with the system supplier design requirements. Required data points will be provided for control by the vessel control and monitor system. All piping will be insulated to protect against heat loss and prevent sweating.

Type:	Copper
Standard:	Type M
Working pressure:	TBD

09.01.03 Duct Systems

The ducting systems design is to be in accordance with the system supplier design requirements. Where required, all ducting will be insulated to protect against heat transfer and prevent sweating.

The duct systems will be provided with sound dampeners or chambers to minimize noise from fan coils or air change systems.

Provisions will be provided for access to ducting for adjustment of flow control valves and access points for cleaning and replacement shall be considered by the Builder.

Note that the interior design has limited space available between the structure and overheads. Ducting in many areas will be required to be flat rectangular sections to accommodate the limited space.

09.02 Galley Air Systems

The Builder will design and provide the galley air systems to comply with the provisions of MCA section 144.4. In addition to the fan coil systems, the galley will be provided with:

- Extraction air stove hood with air balance fresh air intake system.
- Rated maximum capacity of 1504 m³/h.
- Variable speed extraction air system.
- Stove hood extinguishing system with electrically operated fire damper.
- Required emergency shut-offs and control systems.

09.03 Engine Room Ventilation System

We have worked with Delta "I" Systems of Palm Beach, FL for the design and specifications of the engine room ventilation systems. It is requested that the Builder work with these companies for the supply and installation of the ventilation systems.

The ventilation systems are to comply with Class Rules and MCA section 144.2 as applicable.

The port and starboard ventilation system pass up through the cabin deck, up through the salon with intake and exhaust air mist eliminators on the upper deck roomings. Components are as specified in the attached spreadsheet Delta "I" Systems quotation.

09.04 Forward Lockers, Lazarette and Tender Compartment Ventilation Systems

The lazarette and tender compartment ventilation systems are included with the air conditioning system. As these compartments will contain hazardous materials, i.e. petrol and battery systems, the ventilation systems will provide a minimum of 6 air changes per hour. We have selected make-up air handlers to provide fresh air to the compartments to control humidity.

10 ELECTRICAL10A.01 General

The electrical equipment and its installation should meet the standards of BV Class and the standards and recommended practices of the American Boat & Yacht Council.

Atlas Marine Systems has performed preliminary electrical design work and a load study for the electrical system. Electrical panel dimensions and one-line diagrams are provided. In addition, calculations, studies and descriptions will be provided as part of the vessel electrical system agency classification documentation.

The AC electrical system will be a 120/208 VAC, 3-phase, 60-Hertz system with a grounded neutral. Circuit breakers will be 1, 2, or 3-pole as appropriate for the load. Ground conductors will be included in cables to all AC power users.

The main DC electrical system will be a 24VDC system with grounded negative. Circuit breakers will be 1-pole with two conductor circuits to each.

A 12VDC electrical system with grounded negative will be provided in the area of the wheelhouse to power computer monitors and other 12VDC instrument loads as required. The power supply will be thru a DC-DC voltage converter. Circuit breakers will be 1-pole with three conductor circuits to each user (positive, negative and ground).

When at sea, the electrical power will be provided by three (3) diesel engine-driven generators; two in the port engine room, one in the starboard engine room. The generator controls will allow automated or manual paralleling. The Main AC Switchboard will supply electrical power to large users and to sub-distribution panels located throughout the vessel. It will have a split bus and the bus tie switch will be normally closed when the generators are paralleled.

Two shore cables will be provided near the stern of the port lazarets to allow connection to shore generated electrical power when desired. The shore cables will be connected to an Atlas ShortPOWER frequency converter. Preliminary output power is estimated at 60kVA.

An Atlas uninterruptible power supply (UPS) will be provided to provide clean, spike and noise-free AC electrical power for audio-visual entertainment equipment, communications equipment and other noise sensitive users. As part of this system, a "critical load AC bus" with battery backup will be provided to supply devices that require uninterrupted electrical power. An example of this type load is programmed entertainment system tuners or videocassette recorders that lose their settings during power outages and must be reprogrammed by the crew after each electrical power outage. The output voltage of the UPS will be a (120/240 VAC, 60 Hertz) system. Preliminary output power is estimated at 12 kVA.

Ladder type cable trays will be provided in areas where large numbers of electrical power and control cables merge. Cables will be installed in a manner that prevents mechanical and corrosion damage and prevents electrical "crosstalk" and interference between electrical systems.

All electrical equipment, including junction boxes, is to be accessible for service and maintenance.

Route all electrical equipment as required by Class. This includes bonding of metal enclosures to hull ground and high quality marine wiring practices.

Warning labels will be installed where appropriate.

Electric motors will be TEFC type, rated for continuous duty and have an ambient temperature rating of 45 degrees centigrade in engine rooms and 40 degrees centigrade elsewhere. Motors that are part of another system, such as air conditioner air handlers or other appliances, are exempt.

Emergency lighting will be automatically activated if main AC power is lost. There will be at least one emergency light in each major compartment and passageway.

10A.02 ELECTRICAL CONSTRUCTION PRACTICES

10A.02.01 General

Persons installing electrical will be trained marine electricians familiar with quality marine electrical construction practices.

10A.02.02 Electrical Cable Construction Practices

Electrical cable installation (General):

- All cables used are to be rated 45 degrees Centigrade minimum.
- Both ends of all electrical power, control and ground cables will be clearly identified with permanent identification tags based on cable ID numbers provided in the electrical system design documentation.
- The following types of cables will be segregated from each other throughout their entire length: control cables, instrumentation cables, entertainment system cables, AC power cables and DC power cables.
- Shielded cables will be used where specified in the electrical documentation.
- Cables specified by equipment manufacturers will be used.
- Electric cables connected to resilient mounted equipment will have sufficient length to allow free movement of the equipment.

Electrical cable installation (Class Requirements):

- All cables used in the construction are to be approved by the classifying society or constructed in accordance with Class rules or to a recognized standard.
- Cables must be selected as to avoid mechanical damage, water, oil, fuel and excessive temperatures. Where cables could be exposed to mechanical damage, they are to be armored or protected by a conduit.
- Cables may not run under floors where practical.
- Where cables pass through watertight bulkheads or decks, watertight glands are to be fitted.
- Where cables pass through a non-watertight bulkhead, decks or other structural members, they are to be protected against chafing.
- Cable support trays, cable clips, glands and bushings are to be of corrosion resistant materials.
- The distance between cable supports is to be about $6d + 20$ where d is external diameter of cable measured in centimeters. The maximum allowed distance between cable supports for cables is 50 centimeters.
- The minimum bend radius for cables is $4d$ for thermoplastic or rubber-like insulated cables without metal covering ($5d$ if $d > 25$ mm) and $6d$ for the same cables with metal covering.
- Cables are not to be spliced except in approved metallic junction boxes.
- Cables are not to be attached to any tank or pipe carrying fuel or oil.

10A.02.03 Electrical Hazardous Areas

Electrical installations in the port and starboard and tender compartments will need to comply with MCA Rule 14.1.5 for stowage of petrol and other highly flammable liquids:

Electrical equipments should be located well clear of those areas where flammable gases are likely to accumulate within the space and be so constructed as to prevent the escape of sparks (ie IP54 as defined in BS EN 60529:1992 'Specification for Degrees of Protection Provided by Enclosures (IP Code)'). Electrical equipments less than IP54 should each be provided with an easily accessible and identified means of (double pole) isolation outside the space, with a fixed flammable gas detector/detectors fitted in the compartment with connecting alarm sensors on the navigating bridge and elsewhere in the accommodation in accordance with 1413.3.1d.2. Where any of these requirements are not practical, then the electrical arrangements should be installed to a suitably certified standard ie flameproof, intrinsically safe etc.

10A.03 Attachments

The following documents are attached and considered part of this specification:

- AC One Line Diagram (Preliminary)
- DC One Line Diagram (preliminary)
- Main AC Switchboard, Physical Dimensions (Preliminary)
- Main DC Switchboard, Physical Dimensions (Preliminary)

10B ENERGY SYSTEMS, AC10B.01 General

The electrical system control and operating panels will be of yacht quality, ergonomically designed and with crew friendly human interfaces. Consideration will be given to water entry avoidance, corrosion resistance and operation in a high humidity environment.

10B.02 Main AC Switchboard (MACS)

The MACS will be designed and supplied by Atlas Marine Systems.

The MACS will be located in the port engine room and will have all necessary controls, metering and protective devices to control the operation of electrical generators, motorized circuit breakers etc. The following features will be provided:

- Automated and manual starting and stopping of generators based on load requirements.
- Automatic and manual generator paralleling.
- Seamless transfer of power from shore to generator, and generator to generator.
- Operation in single bus or split bus modes.
- Full metering per agency requirements.
- Synchroscope
- Ground current meter
- Automatic load shedding.
- Communication link to vessels alarm/monitoring system for remote monitoring and control of electrical system operation and switchboard functions.
- Connection points and circuit protection for load circuits.
- Plated copper bus, neutral and ground buses.

100.02.01 Main AC Switchboard (MACS)

- Manufacturer: Atlas Marine Systems
- Model: TP-MACS-1400-63.120/208.VN-3, 12.2-72x20.8x30
- Dimensions: 1829 w x 529 d x 762 h
- Weight: 159 kg (350 lbs)

100.06 AC Sub-Distribution Panels

It is planned that one AC sub-distribution panel will be located in each watertight compartment to minimize bulkhead penetrations. The Builder may opt to minimize the number of panels depending upon the actual number of distribution circuits required.

The AC sub-distribution panels in non-technical spaces will be installed in a manner that hides the enclosure from direct view (behind joiner work).

Note that the circuit numbers reflect live connections, I.E., a 3 phase circuit breaker requires 3 circuits in the panel, whereas a single phase circuit requires one panel circuit.

Preliminary sub-distribution panels for AC circuits are as follows:

	<u>Location</u>	<u>Circuits</u>	<u>Circuit Types</u>
1	Port engine room	TBD	TBD
2	Stbd engine room	TBD	TBD
3	Port hull aft	TBD	TBD
4	Port hull fwd	TBD	TBD
5	Stbd hull aft	TBD	TBD
6	Stbd Hull fwd	TBD	TBD
7	Galley & Main Deck	*TBD	TBD
8	Phylbridge & Main Deck	TBD	*TBD

* It will have a split bus and the bus tie switch will be normally closed when the generators are paralleled

100.04.02 AC Sub-Distribution Panel Type

- Manufacturer: MeridianGutix, or equal
- Model: Pragma or equal
- Capacity: TBD
- Main Breaker or Switch: None
- Cable Entry: Various
- Color: TBD
- IP Rating: As required
- Hinged door: TBD
- Branch Circuit Breakers: TBD

10B.05 Shore Power Systems10B.05.01 Atlas ShorePOWER Frequency Converter

A shore power frequency converter will be supplied with the following features will be provided:

- The unit will deliver full output power from any three-phase or single-phase input, at any input voltage from 180-530 Volts AC, and at any input frequency, 50/60 Hertz (assuming adequate power from shore is available).
- The unit will automatically sense the incoming power characteristics and convert the power to the voltage and frequency required by the vessel.
- The output will be pure sine wave output.

• Manufacturer:	Atlas Marine Systems
• Model:	SPA
• Capacity:	60 KVA
• Dimensions:	1676 H x 813 W x 517 D
• Weight:	459 KG (1010 lbs)

10B.05.02 Galvanic Isolators

Galvanic isolators will be provided as per the electrical drawings:

• Manufacturer:	Dairymaid Electric
• Model:	G1-10kA-S-100-CC
• Number:	Two (2)

10B.05.03 Shore Cables

Shore cable features:

• Quantity	2
• Location	Stern of each hull
• Length	TBD
• Capacity	100Amp
• Conductors	4
• Cable reel	TBD

10B.06 Computer Power Source

Exact configuration is to be determined. Computers necessary for MCA compliance are powered from the 24VDC emergency batteries. Other computers are connected supplied by the Main AC, Main DC battery systems, or UPS as appropriate. Exact configuration will be determined later.

10B.07 Uninterrupted Power Source

The entertainment system, noise sensitive and other critical loads including computers will be supplied AC power from a 12 KVA uninterruptible power supply (UPS), which provides the following features:

- Continuously provides conditioned, clean, spike and noise-free AC power for sensitive electronic equipment and additionally provides uninterrupted power upon the loss of AC input power

- The output of the UPS will be configured into two separate outputs, one critical and one non-critical.
- Upon loss of AC power, the non-critical load is disconnected from the UPS converter while the critical load continues to operate on the battery pack until AC power is restored or the battery system is depleted.
- The UPS is sized to accommodate the total load requirement, and the battery pack is sized to accommodate the critical load only.
- Meters are provided to monitor operation.

Power distribution from the UPS will be via dedicated sub-distribution panels. Size and location to be determined.

The UPS system will be designed and manufactured by Atlas Marine Systems, and consist of the following components:

- Frequency converter
- Battery
- Battery Charger

Frequency converter:

- Manufacturer: Atlas Marine Systems
- Model: SP0L12K63J1L43-UD
- Capacity: 12 kVA
- Dimensions: 334 w x 914 d x 969 h
- Weight: 227 kg (500 lbs)

Battery:

- Manufacturer: Atlas Marine Systems
- Model: BP3
- Dimensions: 760 w x 330 d x 760 h
- Weight: 163 kg (360 lbs)

Battery Charger:

- Manufacturer: Atlas Marine Systems
- Model: BC3
- Dimensions: 305 w x 152 d x 356 h
- Weight: 27 kg (60 lbs)

10C SYSTEMS10C.01 General

The one line diagram of the DC electrical system will be as specified in the Atlas Marine Systems drawing 105192

DC Electrical system - General:

- The main DC electrical system will be a 24 VDC system with grounded negative. Circuit breakers will be 1-pole with three conductors visible to each user; positive, negative and ground.
- 24VDC electrical system supplies house and emergency 24VDC loads.
- 12VDC electrical system supplies house and emergency 12VDC loads, if required. This voltage will be provided thru DC-DC converters.
- Generators and Main Engines will be 24VDC, isolated ground systems.
- Battery parallel switch will be installed in the port engine room to parallel 24VDC batteries for engine starting.

DC Electrical system - Class Requirements:

- Battery over-current protection and disconnect switches will be installed in metal enclosures rated IP22 and in compliance with ABYC standards.
- Battery spaces are to be ventilated to avoid accumulation of hydrogen gas generated during charging.
- Batteries are to be securely mounted to prevent movement due to the motion of the vessel.
- Batteries are to be installed in acid-resistant trays to prevent the possibility of spilled electrolyte reaching the boat structure or bilges.

10C.02 DC Distribution10C.02.01 DC Distribution Panels

The Main DC Switchboard will be located as specified in the port engine room

The DC sub-distribution panels in non-machinery spaces will be installed in a manner that hides the enclosure from direct view (behind joiner work). Panels will have to be easily removable.

DC distribution panels will have the following features:

- Volt and current meters to show battery voltage and pertinent DC system currents. These meters will have over-current protection.
- Single pole branch circuit breakers will have a split bus and the bus tie switch will be normally closed when the generators are paralleled or each DC user circuit.
- Ground and Negative buses.

Sub-distribution panels for DC circuits will be as follows:

<u>Location</u>	<u>Circuits</u>	<u>Circuit Amps</u>
1. Main DC Switchboard in Port Engine Room	TBD	TBD
2. Port Eng Rm 24VDC Sub-Distribution Panel	TBD	TBD
3. Salon helm station 24VDC Sub-Distribution Panel	TBD	TBD
4. Salon helm station 12VDC Sub-Distribution Panel	TBD	TBD

10C.02.02 DC Distribution Wiring

The Builder will determine if the emergency lighting and alarm system wiring may be combined with the control and monitor system wiring.

The DC distribution wiring will be limited to:

- Engine room starting and control systems
- Emergency lighting and alarm systems
- Control and monitor systems
- Security systems
- Navigation instruments
- Communication equipment
- Toilet valves

10C.03 Batteries10C.03.01 Engine Room Start Battery Banks

Each engine room will have a starting battery bank consisting of two batteries in series.

- Manufacturer: North Star Battery Co. (Meridian Marine)
- Type: NSB130FT (AGM)
- Number: 4 total; 2 in 2 banks
- Voltage: 12 volt cell
- Capacity: 126Ah 1500 Marine Cranking Amps
- Weight: 38 kg each; 152 kg total
- Dimensions: 560 l x 1251 w x 227 h (each battery)

10C.03.02 24 Volt House / Emergency Battery Bank

To be located in cross deck under the Salon helm station, one bank of two (2) volt cells connected in series:

- Manufacturer: Mastervolt
- Type: MVS1200 (Gel)
- Number: 12
- Voltage: 2 volt cells
- Capacity: 1200 amp-hours
- Weight: 97 kg each; 1,164 kg total
- Dimensions: 215 l x 277 w x 688 h (each)

10C.03.03 24 Volt GPS/Radar Battery Bank

To be located in the Salon helm station, two 12 volt cells:

- Manufacturer: Mastervolt
- Type: TDD
- Number: 2 total; 2 in 1 bank
- Voltage: 12 volt cell
- Capacity: TBD amp-hours
- Weight: TBD kg each; TBD kg total
- Dimensions: TBD

10C.04 CHARGING SYSTEMS10C.04.01 General

- The 24VDC start battery banks in each engine room will be charged by a 50 amp AC powered battery charger.
- Two 100-amp battery chargers will charge the 24VDC house/emergency battery bank.
- One 50-amp battery charger will charge the 24VDC GMDSS Radio battery bank.

10C.04.02 Battery Chargers

Battery chargers will have the following features:

- Battery chargers will be the fully automatic type.
- Battery chargers will have internal over-current protection on the DC output.
- Battery chargers will have voltage regulation with temperature compensation.

10C.04.03 Engine Room Battery Chargers

- Manufacturer: Mustervolt
- Type: MASS 24/30
- Model: 40020500
- Number: 2
- Voltage primary: 180-260VAC, 1 phase, 60 Hz
- Voltage secondary: 26.5-28.8V DC
- Dual output: Yes
- Dimensions: 343 h x 262 w x 120 d
- Weight: 5 kg

10C.04.04 24 VDC House/Emergency Battery Charger

If required, to be located in the Salon Belin station:

- Manufacturer: Mustervolt
- Type: MASS 24/100
- Model: 40021000
- Number: 2
- Voltage primary: 180-260VAC, 1 phase, 60 Hz
- Voltage secondary: 26.5-28.8V DC
- Dimensions: 422 h x 318 w x 150 d
- Weight: 9.1 kg

10C.04.05 24 Volt GMDSS Radio Battery Charger

To be located in the Salon Belin station:

- Manufacturer: Mustervolt
- Type: MASS 24/25
- Model: 40020250
- Number: 1

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-
- | | |
|----------------------|----------------------------|
| • Voltage primary: | 180-260VAC, 1 phase, 60 Hz |
| • Voltage secondary: | 26.5-28.8V DC |
| • Charge current: | 25 amp |
| • Dist output | Yes |
| • Dimensions: | 325 h x 221 w x 112 d |
| • Weight: | 2.8 kg |
-

10C.05 Alternators

Each main engine and generator will not be provided. Charging will rely upon battery chargers as a means of saving weight.

100 LIGHTING AND PLUGS

The lighting systems will be state of the art, high quality, marine fittings and accessories, installed in accordance with the interior designers plans.

Lighting systems for interior compartments that are technical areas will be provided with switch controls only. Other interior and exterior lights, where indicated, will be dimmable.

"Luxury areas" are considered to be the owner's suite, salons, guest accommodations, including upper deck and main aft deck. These lighting systems will be controlled by Light Touch[®] systems.

100.01 Switch Material

Hulkhead and wall switch plate materials will be as per part 13 Interior Concepts for luxury areas.

Switch material for interior compartments that are crew accommodations, bridge, machinery areas, galley, crew mess and service areas will be appropriate to the location. The Builder will provide the Owner's Representative with several options for selection.

	Luxury areas	Other areas
• Manufacturer:	Light Touch or TBD	TBD
• Cover plates:	Light Touch or TBD	TBD

100.02 Plugs & Socket Connectors

Plug and socket connectors will comply with Class Rules.

The number will be sufficient to provide for service areas, entertainment and personal use. The plugs will be as specified in the Part 13 Interior Concepts. Guidelines as follows:

- Each berth will have one plug.
- Each deck will have a minimum of two plugs and a CAT 5 plug for the computer network.
- Each bulkhead will have a plug for every 4 m in bulkhead length.
- A drawer or locker at the salon navigation station will be provided with a minimum of 6 plugs to charge radios and other small equipment.
- Plugs located in wet locations, such as heads, galley, engine rooms, tender compartment and protected deck locker locations are to be ground fault protected and will be provided with moisture proof or watertight covers in accordance with regulatory requirements.

• Manufacturer:	TBD
• Model:	TBD

Note that there may be floor plugs in the salon. These are to be flush mounted plates with covers. To be selected by the Builder.

100.03 Interior Lighting

Interior lighting is to be specified by the interior designer as laid out in the plans.

All lighting listed below is 120 VAC, 60 cycle with exceptions as noted.

Note that there may be some additional lamps required on the final design.

Bulb sizes are to be determined later by the Interior Designer. All lights are to be rated for the environment that they are in; e.g.: moisture proof, watertight, explosion proof.

For night vision, individual lamps, or lamps with dual bulbs are to be fitted in appropriate locations of the vessel. The total numbers of locations are to be determined. The probable list of areas is as follows:

- Fly bridge
- Navigation station
- Exterior stairways
- Aft main deck
- Salon
- Interior stairways
- All lower deck passageways and service areas.

The following interior lighting is offered for budgetary purposes:

100.03.01 Interior Lights

Particular attention should be paid to ensure that bathrooms and the galley are brightly lit. The interior light list is as follows:

100.03.01.01 Main salon

The main salon will be provided with 20 down lights on 4 circuits.

The bar will be provided with under counter lights (TBD)

The navigation station lighting will be appropriate for night use. Lighting is TBD.

Indirect lighting will be provided in ceiling recesses and at floor level under the bar, fixed side furniture and cabinets.

100.03.01.02 Entertainment Lounge (TV area)

The entertainment lounge will be provided with 8 down lights on 1 circuit.

Indirect lighting will be provided in ceiling recesses and at floor level under fixed side furniture and cabinets.

100.03.01.03 Forward Passageway & Entry Stairs

The forward passageway will be provided with 6 down lights on 1 circuit.

Indirect or floor level lighting will be provided at floor level under fixed side furniture and cabinets.

Stairs will be fitted with indirect lighting for each stair with an overhead landing area down light.

10D.03.01.04 Forward Owner Suite & VIP Cabin

All lighting circuits will be on dimmer control circuits.

Each cabin will be provided with 12 down lights. Circuits will be:

- At entry door, door to deck and closet (4 lights)
- At bed area (4 lights)
- Bathroom (2 down lights plus mirror column lights)
- Shower (1 light)
- Toilet (1 light)

In addition, each closet will have internal lights working from a door activated switch.

Each bed will have 2 reading lights.

Indirect or floor level lighting will be provided at floor level under fixed side furniture and cabinets.

10D.03.01.05 Port Hall Guest Cabins

All lighting circuits will be on dimmer control circuits.

Each cabin will be provided with down lights and indirect lighting. Circuits will be:

- At entry door and floor area, (6 lights)
- At bed area (2 reading lights)
- Indirect ceiling and floor level lights
- Bathroom (2 lights plus mirror column lights)
- Shower (1 light)
- Toilet (1 light)

In addition each closet will have internal lights working from a door activated switch.

Indirect or floor level lighting will be provided at floor level under fixed side furniture and cabinets.

10D.03.01.06 Crew Accommodation Cabins

All lighting circuits will be on dimmer control circuits.

Each of the four cabins will be provided with down lights. Circuits will be:

- At entry door and floor area: Capt: 5 lights; other crew: 4 lights
- Reading lights at bed area (light each berth position)
- Indirect floor and ceiling lights
- Bathroom (1 light)
- Shower (1 light)
- Toilet (1 light)

In addition each closet will have internal lights working from a door activated switch.

10D.03.02 Technical Areas10D.03.02.01 Crew Mess & Laundry

All lighting circuits will be on (summer) control circuits.

Crew mess will be provided with (8) down lights. There will also be provision for night lighting. Indirect or floor level lighting will be provided at floor level under fixed side furniture and cabinets.

The laundry will be provided with (4) down lights.

10D.03.02.02. Gallery

Galley lighting will be provided with multiple circuits for night and day use.

- * Circuits: 2 x overhead; 1 under counter; 1 x indirect
- * Manufacturer: TBD
- * Model: TBD
- * Rated: TBD
- * Illumination: TBD
- * Power: 120/60
- * Dimensions: TBD

10D.03.02.03. Tender Compartment, Port & Starboard Lazarettos

The tender compartments and lazarettos will contain petrol and/or battery systems and require appropriate rated fixtures.

- * Number: 2 for port lazarette
2 for starboard lazarette
2 or 4 for tender compartment
- * Manufacturer: Aqua Signal, or equal
- * Model: TBD
- * Rated: ELExe
- * Illumination: TBD
- * Power: 120/60
- * Dimensions: TBD
- * Weight: TBD

10D.03.02.04. Engine Rooms

Each engine room will contain six (6) fluorescent light fixtures, one (1) of which will be a self-contained emergency light. In addition, there will be a bilge light provided forward and aft of the engine.

Primary lighting:

- * Number: 3 per compartment
- * Manufacturer: Aqua Signal, or equal
- * Model: 10444/15200
- * Rated: 1P 67
- * Illumination: 2 x 40 watt element

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- Power: 120/60
- Dimensions: 1340 x 192 w x 169 d
- Weight: 6.6 kg each

Emergency lighting:

- Number: 1 per compartment
- Manufacturer: Aqua Signal, or equal
- Model: 0248406000
- Rated: ENEC
- Illumination: 2 x 40 watt element
- Power: 120/60
- Dimensions: 1400 x 230 w x 163 d
- Weight: 14 kg each

100.03.02.05 Refrigerated Room

The walk-in refrigerator will be lighted. The switch will be located outside the door and have an "on" indicator:

- Number: 1 per compartment
- Manufacturer: TBD, or Aqua Signal, or equal
- Model: 104403200
- Rated: IP 67
- Illumination: 1 x 115 watt element
- Power: 120/60
- Dimensions: 1340 x 192 w x 169 d
- Weight: 6.6 kg

100.03.02.06 Other Areas

Additional lighting will be provided for the following spaces. The lighting will be incandescent bulbs, installed in protective enclosure rated as required by the Rules.

- In upper deck technical areas (Z) (at captive reels)
- Stair lockers

100.04 NAVIGATION LIGHTING

Navigation lighting will be in accordance with COLREGS 1972 for sailing yachts (20 < 50 meters. All navigation lighting is to comply with the approval of the Flag Administration. The lighting will be arranged with proper panel display and alarms as required by the Rules.

The following light models are selected from the AquaSignal 2002-2003 catalogue but are not intended to restrict the Builder to this manufacturer.

Navigation lights to be controlled from the MIMIC panel at inside navigation station. (anchort, alarm, over, RUC)

10D.04.01 Running Lights

All primary running lights will be steel lamp fixtures if required:

- Manufacturer: Aqua Signal 70M series
- Port side 3584205
- Starboard side 3583105
- Steaming 3581005
- Stern 3582705
- Rated: IP 56; IMO
- Power: 2 x 65 watt; 120/60
- Dimensions: 350 h x 220 sq base

10D.04.02 Anchor Light

The anchor light will be single fixture lamp. The forward anchor light will mount on the forward beam stanchion.

- Manufacturer: Aqua Signal, or equal
- Model: 3070705
- Number: 1
- Rated: IP 56; IMO
- Power: 65 watts; 120/60
- Dimensions: 320 h x 220 sq base

10D.04.03 Main Mast Lights

In addition, the vessel will be provided the following 307 lights mounted on the main mast.

- Manufacturer: Aqua Signal, or equal
- Masthead top 307 series red
- Mast side lights at top 307 series green, mounted with 2 x vertical separation to masthead red.
- Rated: IP 56; IMO
- Power: 65 watts; 120/60
- Dimensions: 320 h x 220 sq base

10D.05 EXTERIOR LIGHTING10D.05.01 General Deck Lighting

The following deck lighting will be provided. The Builder will provide light specifications for the approval of the owner's representative.

- Safety and courtesy lights, as required by the Rules, at all exterior stairs, transom steps, forward cockpit and entries, including: upper deck stairs and port/starboard main deck stairs to interior.
- White lights in all forward cockpit storage and ground tackle lockers.

10D.05.02 Main deck aft

The aft main deck overhead will have flush mounted lights and indirect lighting in the ceiling recess and under floor furniture, controlled by the Light Touch system. The final arrangement is to be determined by the Architect.

Down Lights

- Number: 24
- Circuits: 4
- Manufacturer: Underwater Lights, or equal
- Model: MRL6
- Rating: IP 65
- Power: 40 watt; 120/60
- Reflector: Angle to be determined (10°, 20°, 30° or 40°)
- Dimensions: _ bezel; _ mm cutout; _ mm depth

Indirect Lights:

- T30

10D.05.03 Upper Deck

The upper deck lighting will be mounted in the existing frame for deck illumination. The following is provided for budget purposes:

- Number: 20 white down lights
- Circuits: 2
- Manufacturer: Underwater Lights, or equal
- Model: Medium eyeball
- Rating: IP 65
- Power: _ watt; 115/60

10D.05.04 Deck Flood Lights

Deck flood lights will be mounted under the main mast antenna supports to illuminate the fore deck area and aft upper deck.

Mast circuits: Port bow
Starboard bow
Port upper deck
Starboard upper deck

- Number: 4
- Circuits: 4
- Manufacturer: Underwater Lights, or equal
- Model: S2501 F-120V Par 30

10D.05.05 Mast Flood Lights

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Main deck installed flood lights will illuminate the main mast. These will be welded aluminum inserts in the main deck as per the drawings.

- Number: 4
- Circuits: 1
- Manufacturer: Underwater Lights
- Model: PAR 30 Adjustable Flood Light
- Rated: IP 68
- Power: 150 watt; 120/60; metal halide lamp remote dimmable
- Reflector: 99 mm dia; angle to be determined (5°, 8°, 25° or 45°)
- Glass: 15 mm (for weather deck area)
- Dimensions: 244 w x 133 d x 205 h

10D.05.06 Controllable Spot Lights

Remote controllable spotlights will be provided with dual operation stations. One light will be intended for port side use from the port flybridge helm with remote operation to the inside helm. The other light will be intended for starboard side use from the starboard flybridge helm with remote operation to the inside helm.

The controllable spotlights will provide for full 360° coverage with maximum overlap possible.

- Number: 2 (of a single light)
- Circuits: independent
- Manufacturer: The Carlisle & Finch Co.
- Model: XY2EDE-RF
- Power: 285/20; 120 VAC
- Dimensions: 386 l x 324 w x 333 h
- Weight: 12 kg
- Master control: 2 x C4-2-1
- Slave control: 2 x C4-2M-1

10D.05.07 Docking Lights

Lighting will be provided in the aft upper deck for night operations with the tender and docking. Lighting will be flush mounted to the hull using welded aluminum inserts as per the drawings.

- Number: 2
- Circuits: 1
- Manufacturer: Underwater Lights
- Model: PAR 30 Adjustable Flood Light
- Rated: IP 68
- Power: 150 watt; 120/60; metal halide remote dimmable
- Reflector: 99 mm dia; 45° angle
- Glass: 15 mm
- Dimensions: 244 w x 133 d x 205 h
- Weight: 3 kg

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Emergency lighting is to be provided in the vicinity of egress and the 'overhead' area in way of the lavelling position(s). The lighting shall be supplied from the emergency source of power.

Additionally, each cabin and enclosed occupied space will be provided with one floor light.

Alcove, internal and external stairs and exits giving access to and including the master and cabin crew work areas shall be adequately lit.

Emergency lighting will meet the requirements of Rules. The Builder will work with the Authority for the required safety lighting. Note that we have specified safety lights on the interior light list. The exact number and type are to be confirmed by the Builder.

EMERGENCY LIGHTING

Number:	36
Colour:	4
Manufacturer:	1. Emergency Lights
Model:	GD06-230 (model vary for projection angles)
Wattage:	Type approval for underwater use
Power:	150 watt, 120/60
Reflector:	TR1
Dimensions:	TR2
Weight:	2.5 kg (typ) fixture
	2 kg ballast
Notes:	8 lights between 0000 and 0000 16 lights outboard hulls between 0000 and 1800 2 lights inboard of 2400 (outboard) 2 lights inboard of 3800 (inboard)
	Underwater lights will be provided, both for safety and visual effect. The lighting will be welded in fixtures below the waterline with the following details:

Underwater Lights

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10E CATHODIC & LIGHTNING PROTECTION

10E.01 Cathodic Protection

An active or impressed current cathodic protection system by Cathelco Ltd will be provided. The hull monitor and system alarms will be displayed on the vessel monitoring system. The builder will install the system in accordance with the suppliers' requirements.

In addition, a Sea Water Pipework anti-fouling system will be provided by Cathelco Ltd.

Please refer to the attached quotation and supplied drawings by Cathelco, Ltd.

10E.02 Lightning Protection

A lightning protection system is presently under consultation. Final design is to be determined.

11 ELECTRONIC SYSTEMS

The vessel will be outfitted with electronics that are state of the art at the time of construction. The navigation and communication equipment are to be compliant with SOLAS and Global Maritime Distress & Safety System (GMDSS) for A3 service and other requirements as applicable.

The electronic systems will be Owner supplied, provided by Larry Smith Electronics, (LSE) Riviera Beach, FL. The Builder will coordinate engineering requirements for the electronics systems and provide support for the installation of the electronic systems as required by LSE.

This is a preliminary specification is subject to final engineering, revisions and updates in technology.

A provisional list of equipment follows for planning purposes. As contractual arrangements for both the Builder and LSE are pending, the Builder will provide a provisional budget inclusive of all support to be provided as follows:

11.01 Electronics System Support

The Builder will provide the following work for the electronic systems:

- Running all cables in accordance to schematics provided by LSE.
- Manufacture suitable housings and control positions, as well as the cutting, drilling and tapping of surfaces to mount electronic equipment.
- Supply suitable power requirements in accordance to wiring schematics provided by LSE.
- Provide for the safe storage of all delivered equipment and to provide suitable refuge facilities.
- Provide air conditioning to the electronic cabinets.

11.02 Electronic System Power Supply

The main power supply will be 115/208/1/60 VAC powered from the main electrical panel and emergency electrical panel. The secondary power supply will be the 24 VDC battery bank. The DC power supply will integrate with the emergency lighting.

The Power supplies are to be stand alone cable runs, with a single bow to stern run in each hull, with cross-over lines and vertical run to the wheelhouse. All power users, computers, monitors, data acquisition boxes and panels will accept and require dual voltage supply.

11A CONTROL, MONITOR, ALARM & SECURITY SYSTEMS

A Radio Telexed VHF BV vessel data acquisition and safety system capable of monitoring up to 2000 data points will be provided, to be in compliance with Class Rules and MCA requirements. The Builder will budget for 850 data points. This system will monitor additional vessel functions not addressed in the navigation light safety and control panel and will include, but not be limited to the following:

- Steering systems
- Main engine systems including pitch control
- Generator and electrical systems
- Thruster operations
- Bilge and fire pump systems
- Fuel systems
- Fresh water systems

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- Hydraulic systems
- Pneumatic systems
- Lube oil systems
- Waste treatment systems
- Refrigeration systems
- HVAC systems
- Entry points & hatches as required
- MCMC Panel function
- Rigging loads and sailing data (estimated 50 data points)

The data acquisition system is operated over a local area network with workstations at the station inside helm station, fly bridge helm stations, engine rooms, Captain's cabin, and Engineer's cabin. This network is to be fully redundant and can be operated from any one of the multiple computers should there be a failure.

The fire detection and alarm system is to comply with Class requirements and MCA Part 14, Fire Protection and as specified in part 07E.01 of this specification.

The monitor, control and alarm systems should meet Class Rules, MCA requirements and the standards of SOLAS regulations II-1/ Part E- and additional requirements for periodically unattended machinery spaces (when appropriate), so far as it is reasonable and practicable to do so.

11A.01 Control & Monitoring Systems

Provisional Control & Monitor System Equipment list is:

11A.02 Control & Monitoring Systems

A computer network system will be provided by LSE.

Part	Model	Number
Radio Zeeland Brainbox 5000 Computer Network	RAD-BRAIN-5000	1
D-Link Marina WiFi Receiver	DWL-6510	1
Pesantia Bied 2.4 Gig WiFi Antenna	PRE-2.4-ANT	1
LSE JCOM 10/100 24 Port Switch	LSE-JCOM	1
Atlantic Modular 8 Wall Plate	MOD-PLATE-8	1

11A.03 Security Systems

Provisional Security System Equipment list provided by LSE:

Part	Model	Number
Panasonic Outdoor Unifixed PTZ Camera	PANWVCW864A	1
Panasonic Unifixed W/Preset Color Camera	PANWVC5854B	2
Ether Camera Housing	EX400-DC-KW	2
Panasonic Vandal Resistant Mini Dom Camera	PANWVCW474S	2
Panasonic WJSX150A 16x4 Matrix Switcher	PAN-WJSX150A	1
Panasonic PS Data System Controller	PANWVCU630	1
Panasonic Hard Drive/16 Channel 320GB Interface	PANWJHD500BV	1
Altronix 8 Camera Power Supply	ALTV1224-1	1

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Creston Professional Digid Bus Ctrl System	CRB-PRO2	1
Creston Single Port 10/100 Control Card	CRB-CRNET-1	1
Creston 16 Button Custom Panel Interface	CRB-CNPI-16	2
Creston Touchpanel Control System	CRB-TPS-4500L V2	2
Creston Back Box	BB-5000	2
Creston TPS-VID-1 PCB Card	CRB-TPS-VID1	2
Creston 16x5 6.4" Touchpanel	CRB-TPS-10001	2
Creston BB-1000L Back Box	BB-1000L	2
Creston ColorTouch Wall Mounted Touchpanel	CRB-CT1000	3
Creston Back Box CT/LC1000 Wall Mount	BB-1000L	1
Creston Connecting Block	CRB-CNTBLOCK	1
Creston CNPVS-75 Power Supply	CNP-CNPVS-75	1

ENTRY/EXIT CONTROL		
Weigand USB Converter	WIE-DEM-WS2USB-V2	2
ProxPoint Plus HDR-6005B Reader	PRO-RDR-6005B	2
ProxKey II BDG-1346 Card	PRO-BDG-1346	20

PAGING SYSTEM		
Visiplex VS40 2W Digital Transmitter	VIS-VS40	2
Visiplex Alphabetic Pager	VIS-VP-2	10

PECK SENSORS/DOOR CONTACTS		
Sure Action SU-111 Zone Processor	SUR-SU-111	12
Sure Action SU-EN40P Stress Sensor	SUR-SU-EN40P	48
Altronix 8 Camera Power Supply	ALT-PS1224-1	1
Door Contact Security	GR1-20RFTW3 GR1-20RFT	16

Part	Model	No.
THERMAL IMAGING CAMERA		
Night Vision NightNay 3000i Camera	NVT-NN3000I	1

11A.03.02 Security Safes

The Builder will supply and install the following safes. Final locations within the interior design are to be determined. As follows:

Note: Electronic safes to have key override.

- Owner's suite: 1 laptop sized digital code
- VIP: 1 laptop sized digital code
- Each Guest cabin: 1 'hotel' size digital code (6 total)
- Captain's cabin: 1 laptop sized digital code
- For each crew: 1 'hotel' size digital code (6 total)
- Salon/Ship Salter: 1 combination safe
1 digital safe

11A.04 Fire Detection and Alarm System

The Builder will coordinate the installation of the fire detection and alarm system sensors with the control and monitoring system.

11B NAVIGATION AND COMMUNICATION SYSTEMS

A provisional list of equipment follows for planning purposes. As contractual arrangements for both the Builder and LSE are pending, the Builder will provide a provisional budget inclusive of all support to be provided as follows:

11B.01 Sailing Instruments

SPEED/DEPTH/WIND): to be 12 VDC from voltage converter;

Part	Model	Qty
B & G Hydra 2000 Cruise Pack	BG-HY-SYST-1	2
B & G Type 213 W/80' Cbl. J-Box Masthead Unit	BGHD30000	2
B & G 36M Mast Vertical MHU Cable	BGHD30006	2
B & G HY 2000 Full Function Display	BG-HY-FFD-PK	3
B & G 360 Deg Wind Angle Display	BG2134401016	3
B & G HY2020 Red Display Pack W/Switch	BG-HY2020RED/S	4
B & G Air Temperature Sensor	BG-224-00-066	1
B & G Barometric Pressure Sensor	BG69000007	1
B & G Sea Temperature Probe Sensor	BG-224-00-065	1
B & G Bronze FlushMt Depth Transducer	SEN-DPT-HMP	2
B & G Bronze FlushMt Speed Transducer	SEN-SPD-HMP	1
LSE Remote Transducer Switch	LSE-XDCR-SWITCH	1

11B.01.02 Radar and Navigation Equipment

Part	Model	Qty
RADAR		
Furuno 2127 Black Box W/4' Array Radar	FUR-FAR2127BB/4	2
Furuno Gpio Interface Board	GC-10	2
Furuno 21x7 Radar Remote Trackball Control	RCU016	4
Chartplotter		
Radio Zeeland Brainbox 5000	RZDQ1639/24	1
Transas NS3000 ECS Chartplotting Software	TRA-NS3000	1
Transas World Collection Color Vector	TRA-3000	1
Transas AIS NS3000 Transponder Interface	TR-NS3000-18	1
Transas Radar Integration Board	TR-N-IRWC-01	1
Valhalla Flexible Grey Waterproof Keyboard	VEL-FWVK	1
Valhalla 100' Wireless USB Blk Keyboard	VEL-WRFKYBD	1
Valhalla 100' Wireless RF Mouse	VEL-WRFM	1
DJS Cat 5 Bundled/Shielded Cable		100'
Valhalla Kvm CAT5 Extender	KVM-EXT	1
GPS		
Leica MX420-8 8 port DGPS	LEIMX420/8B	2
Shakespeare 4" High 1"-14 Thrd SS Mount	SH-4765	2

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AIS		
Leica MX531 AIS+DGPS W/Navigation System	LEI-MX531/NAV	1
Leica AIS Software License	LEI-T0460	1
Shakespeare 4" High 1"-14 Thru SS Mount	SH-436S	1
Monitors		
Valhalla 13" 1500nVGA Sunlite Monitor	VEL-15/1500	4
Valhalla 18" 650nVGA Daylight VGA Monitor	VEL-18/650	3
LSE Custom Vga Switching System	LSE-1825	1
SONAR		
Sinnad SL30 Black Box Dual Pod Sonar	SIM-SL30D	1
Sinnad 30M SL30 Cable	43601370000	1bd

11B.01.03 Autopilot and Gyro Compass System

Part	Model	No:
GYROCOMPASS		
Anschutz Standard 22 G/GM Gyrocompass	ANSMBST2213	1
Anschutz Analog Steering Repeater	ANSMBST2020	2 or 3
AUTOPILOT		
Anschutz PilotstarD Digital Autopilot	ANSMBST1930	1
Anschutz PilotstarD Second Stat Autopilot	ANSMBST1954	1
Anschutz Rudder Angle IP23 Indicator	ANSMBST1627	1
Anschutz Rudder Angle Indicator Amplifier	ANSMBST1652	1
Anschutz Follow Up W/Take Over Tiller	ANSMBST1957	1
Anschutz 2 Pos Change Over Switch	ANS4900912B	1
Anschutz Change Over Relay	ANS4900910	1
Anschutz Override Tiller System	ANSMBST2001	1
Anschutz Follow Up W/Take Over Tiller	ANSMBST1957	2
Anschutz Rudder Angle IP66 Indicator	ANSMBST1649	2
Anschutz IP66B RA/ROT Display	ANSMBST1119	2

11B.01.04 Compasses

Part	Model	No:
Sinnad Magnetic Compass	Apc-135 6"	1

11B.02 COMMUNICATIONS

Part	Model	No:
GMDSS A3		
Furuno GMDSS Console System	FUR-RC1015	1
Furuno VHF Remote Control Unit	FUR-RB760	1
Furuno RB700 Connector Kit	000138998	1
Furuno FAXS Active Antenna Coupler	FUR-FAXS	1
Comrad 8' 6db VHF Antenna	AV60PB	4
Procom Flange 1" Deck Antenna Mount	FLG	4

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Comrod 23' 2 Piece SSB Antenna	AT731S23-2	2
Shakespeare Swivel kit 81-S Ant & 408 Upr Antenna Mounts	SH-410	2
Furuno Pelcom15 SSAS Upgrade	SSAS/F15	1
VHF		
Standard Quantum Black DEC/VHF Radio	STA-GN1360S	2
Comrod E 6db VHF Antenna	AV60P8	2
Procom Flange 1" Deck Antenna Mount	FLG	2
HANDHELD VHF'S		
Standard HX460S Black SW H/H VHF	STA-HX460SB	6
Manufact MasterCharger & Gong Charger	MC6/HX460S	1
Icom 2WGMDS Submersible HH VHF	ICD-GM1500	2
NAVTEX		
Furuno NX500 GMDSS EMO Navtex Receiver	FJR-NX500	1
Furuno NX5 Active Antenna Coupler	FUR-NX5	1
Furuno NX500 External Data Connector	004511790	1
Comrod Whip Antenna	AR88-H8M	1
Shakespeare 4" High 1" x 1/4 Tied SS Mount	SH-4365	1
SATCOM		
Nera Fleet 77 Inmarsat B System	NER-F77	1
Nera Terminal Adapter	NER-TA	3
Vallalla ISDN Fleet 55/77 Modem	VSL-ISDN/M	1
Nera F33 Satellite Communications System	NER-F33	1
Nera F33 Terminal Adapter Kit	NER-WC-TA	1
GPIRB		
Nor.Airborne S1520 SatFind 406MHz GPIRB	NAT-S1520	1
S.A.R.T.		
Nor.Airborne 9GHz Portable GMDSS SART	NAT-9420	1
SATELLITE TELEVISION		
Orbit AL7203 BCM Satellite TV Antenna	ORB-AL7203	1
Orbit American DSS LNB Kit	18-6436-4-1	1
Orbit European Kit	EURO-KIT	1
Orbit Remote Control Via Modem Kit	ORB-RCVM	1

11B.03 Telephone System

Part	Model	No.
TELEPHONE SYSTEM		
Panasonic KXTDA200 Hybrid (x192 Basic) PBX System	PAN-KXTDA200	1
Panasonic L Type Power Supply	KXTDA0103	1
Panasonic 16 Port Analog Line Card	KXTDA0181	1
Panasonic Option Card	KXTDA0190	1
Panasonic Remote Maintenance Card	KXTDA0196	1
Panasonic 8-Port Digital Hybrid Line Card	KXTDA0170	1
Panasonic 4-Port Door Phone Card	KXTDA0181	1

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Panasonic 4 Port IP Cord	KXTDA04B4	1
Panasonic KXT7453 DigDisp 24Button Spkr Phone	PAN-KXT7453B	3
Panasonic KXT7425 Dig 24Button Blk Spkr Phone	PAN-KXT7425B	9
Panasonic 200mlz/Multil Line Cordless Telephone	PAN-KXT7885	2
Okidata Microline 124T Serial Impact Printer	OKI-841184T-S	1
UPS	HYTSU700NET IWT SU700NET 700VA/450W	1
CELLULAR TELEPHONE		
Cellular SXXe GSM 850/1900 Cellular phone	TEL-SX5EGMSVIT/PC	1
Comrad UHF/GSM Multi Frequency Antenna	AC15P	1
Procom Fänge 1" Deck Antenna Mount	FLG	1
ENGINE ROOM PHONE		
LSE Cordless E/R Phone W/Headset	LSE-CERPS	2
Amisco SRN Blue Strobe Light	ASSSX51SL1B	2
High Output Loud Ringer	196-U Alltel	2

11C ENTERTAINMENT SYSTEMS

A provisional list of entertainment equipment is as follows:

11C.01 Main A/V Distribution Systems

Part	Model	No:
Kaleidescape Base System	KAL-KBASHSYS	1
Kaleidescape (Set For Region 6) DVD Player	KAL-KUEADER-2000	1
Kaleidescape Movie Player	KAL-KPLAYER-2000	7
Direct TV HD Tuner	DIR-HD	3
Extron DA6 YUV A Distribution Amp	60-494-01	3
Extron Composite A/V Distribution Amp	60-692-31	3
Audio Request F Series 200 Pro 3 Zone Music Server	AUD-FSERIES-200	2
Extron MDA SA RCA Distribution Amp	60-441-01	2
Crestron Video Sensor Module Multiswitch	CRE-STVS	3
Middle Atlantic Rack Allowance	MID-RACK-B	
Speaker Cntr CRE 3 Two Speaker Pair	SPE-ASA88820	2
MB Quart 6.5" Marine Speaker Pair	MBQ-NKD116	2
Crestron ColorTouch Wall Mounted TouchPanel	CRE-CT1000	
Crestron Rack Box CTR-C1000 Wall Mount	BB-1000L	
Crestron 1-Way Remote RF Receiver	CRE-CNREGWA	
Crestron Waterproof Handheld Remote	CRE-WPR-48	

11C.02 Flybridge Systems

Part	Model	No:
Clarion AM/FM/CD/Controller	CLA-XM03-RET	1
Clarion Waterproof Control W/24' Cable	M301RC-RET	1
Clarion 24' Extension Cable	M301RXC-RET	1
MB Quart 6.5" Marine Speaker Pair	MBQ-NKD116	4

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MH Quirt 16" Marine Subwoofer	NWD254	2
Clarion 320W 4/3/2-Channel Power Amplifier	CLA-APX480M	3
Crestion ColorTouch Wall Mounted TouchPanel	CRP-CT1000	1
Crestion Rack Box CTA/C1000 Wall Mount	BR-1000L	3

11C.03 Main Salon Systems

Part	Model	No:
Speaker Craft CMS 8 Two Speaker Pair	SPE-ASM66R20	2
B&K Stereo Amplifier	BK-SE125.2	1
Crestion 2-Way Wireless Touchpanel	CRE-STX-1700C	1
Crestion Crestet Volume Control Module	CRE-C2N-VEQ4	1

11C.04 TV Room Systems

Part	Model	No:
NEC 61" Plasma Display	NEC-PX-61XR3A	
NEC Wall Mount Bracket	FWMK	
Sony DVP-NS575 DVD Player	SON-DVP-NS575	
B&K Audio/Video Receiver	BK-AVR505	
B&K 12-Channel Power Amplifier	BK-AV1260	
B&K 6-Channel Power Amplifier	BK-AV2600	
Speaker Craft CMS 8 Two Individual Speaker	SPE-ASM93875-1	5
M&K Sound 8" White Subwoofer	MKS-MX700	
Crestion 2-Way Wireless Touchpanel	CRE-STX-1700C	
Crestion Professional Dual Bus Control System	CRE-PRO2	
Crestion Single Port 10/100 Control Card	CRE-CZENET-1	
Crestion Crestet Volume Control Module	CRE-C2N-VEQ4	
Crestion Connecting Block	CRE-CNTBLOCK	
Crestion CNPWS-75 Power Supply	CRE-CNPWS-75	
Crestion Bi-Directional RF Gateway	CRE-STREFGWX	
Crestion 3 Port RS-232/422/485 Control Card	CRE-C2COM-3	2
Linksys 8-Port 10/100 Ethernet Hub	LEN-168998	
LSI Interconnect Package	LSI-ICP-S	

11C.05 Owner & VIP Suite Systems

The owner suite and VIP suite will each have identical systems as follow:

Part	Model	No each:
NEC 41" Plasma Display	NEC-PX-41XMDJWS	1
NEC Wall Mount Bracket	FWMK	1
Samsung SV-7000W Worldwide Multi-System Converter VCR	SAM-SV7000W	1
B&K Audio/Video Receiver	BK-AVR505	1
Speaker Craft CMS 8 Two Individual Speaker	SPE-ASM93872-1	5
M&K Sound K9 Powered Subwoofer	MKS-K9	
Crestion 2-Way Wireless Touchpanel	CRE-STX-1700C	
Crestion Bi-Directional RF Gateway	CRE-STREFGWX	
Crestion MP2E Control Processor	CRE-MP2E	
LSI Interconnect Package	LSI-ICP-H	

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FORWARD SUNDECK		
MB Quart 6.5" Marine Speaker Pair	MBQ-NKD116	2
Creston 6-Button Decorator Keypad	CRE-C7N-DE6W	1

IIC.06 Guest Cabins Systems

The three (3) guest cabins will each have identical systems as follow:

Part	Model	No:
NEC-Mitsubishi 30" LCD Display	NEC-LCD3000-BK	1
Premier CTM-VESA Wall Bracket	PRE-CTM-VESA	1
Samsung 100-240V 50/60 Hz SV5000W VCR	SAM-SV5000W	1
Extron SW 4AV Video Switcher	60-4B4-21	1
JVC Code Free Home Theater	JVC-DS-TP582	1
Speaker Craft CRS One In-Ceiling Speaker Pair	SPE-ASM86610	1
Creston Bi-Directional RF Gateway	CRE-STRFGWX	1
Creston MP2E Control Processor	CRE-MP2E	1
ISE Interconnect Package	ISE-ICP-B	1
*Note: Optional Creston STX-1700C 2-Way Wireless Touchpanel		

IIC.07 Galley Systems

Part	Model	No:
LG 23" LCD Display	LG-L2323T	1
Premier Mounts Flat Wall Mount	PRE-PRE	1
Samsung SV-5000W Worldwide Multi-System Converter VCR	SAM-SV5000W	1
Speaker Craft CRS Two Speaker Pair	SPE-ASM86620	2
Kramer 903 Mini-Amplifier	KRA-703	1

IIC.08 Crew Mess Systems

Part	Model	No:
NEC-Mitsubishi 30" LCD Display	NEC-LCD3000-BK	1
Premier CTM-VESA Wall Bracket	PRE-CTM-VESA	1
Samsung 100-240V 50/60 Hz SV5000W VCR	SAM-SV5000W	1
Extron SW 4AV Video Switcher	60-4B4-21	1
JVC Code Free Home Theater	JVC-DS-TP582	1
Speaker Craft CRS One In-Ceiling Speaker Pair	SPE-ASM86610	1
Creston 2-Way Wireless Touchpanel	CRE-STX-1700C	1
Creston Bi-Directional RF Gateway	CRE-STRFGWX	1
Creston MP2E Control Processor	CRE-MP2E	1
ISE Interconnect Package	ISE-ICP-B	1

11C.09 Captain's Stateroom Systems

Part	Model	No:
NEC-Mitsubishi 30" LCD Display	NEC-LCD3000-BK	
Premier CDM-VESA Wall Bracket	PRE-CDM-VESA	
Extron SW 4AV Video Switcher	60-434-21	
Samsung SV-5000W Worldwide Multi-System Converter VCR	SAM-SV5000W	
PVC Code Fax Home Theater	PVC-DS-TPS82	
Speaker Crawl CRS One In-Ceiling Speaker Pair	SPE-ASM866H	
Omniion 2-Way Wireless Touchpanel	OMI-STX-1700C	
Creston Bi-Directional RF Gateway	CRS-STRT-GWX	
Creston MP2E Control Processor	CRS-MP2E	
LSE Intersystem Package	LSE-ICP-B	

11C.10 Crew Cabin Systems

The three (3) crew cabins will each have identical systems as follow:

Part	Model	No:
Panasonic High-Power CD Player/Receiver w/Aux Input	PAN-CQ-C5310U	
Speaker Crawl 6.1 BT Individual Speaker	SPE-ASM96410-1	
LSE Cables & Hardware	LSE-CH-L	
LSE Satellite Distribution System	LSE-SDS-F	
LSE CATV & FM Distribution System	LSE-CATV-B	

12 Interior Concepts

Refer to the General Arrangement drawings by the Architects and Interior Designer for the interior arrangements. The clients design team has provided renderings and descriptions for the concept.

Michael Leach Designs will be providing the design and specifications for the interior. Their work will be submitted under separate cover by the Owner.

12.01 General Notes

It is the intention that the interior arrangement for this sailing yacht, as illustrated in the general arrangement plan, will be fitted out to top quality yacht standards. The level of complexity is shown in attached renderings.

No space shall be left unused. Where reasonably possible, the Builder shall make all 'dead' spaces suitable to be used for lockers and storage areas by fitting out and providing access for use.

All interior components, finishing and decorative materials and similar items, shall be in accordance with MCA requirements.

Special attention shall be given for protection and covering of all completed, finished or unfinished surfaces during construction.

All surfaces, which may be exposed during use, such as the insides of lockers, drawers, cabinets, etc., shall match the surrounding joinery work unless otherwise stated.

All wood joints, as in drawers, are to be daded, dovetailed or rabbeted, and glued in accordance with the best marine practice or as specified by the interior designer.

The Builder is responsible for providing proper stowage for all Owner supplied equipment as noted in part 16.02

12.02 Mock-Ups & Samples

Mock-ups will be specified by the interior designer and owner's representative.

12.03 General Notes12.03.01 Paint Work & Protective Coatings

All paint work and protective coatings are to be suitable for the marine environment.

Colours, stains and gloss, satin or matt finishes will be selected by the Owner or his designated representatives.

All woods are to have a protective coating applied. This includes all sides and edges whether exposed or hidden.

12.03.02 Bulkheads

The bulkheads and paneling will be constructed of a lightweight cored panel mounted on isolated supports as indicated in the noise and vibration drawing package. The Builder will

ensure required strength for the panel area with consideration for mounting speakers, video screens and other heavy objects.

Finish wood applications will be with veneer application over light weight panels as determined by the Architect and noise/vibration consultant.

12.03.03 Ceilings

As per the Owner's interior designers specifications.

12.03.04 Floors

As per the Owner's interior designers specifications with the following considerations:

- * All floors will be floating and are to have removable sections where machinery or system components require access. The Builder will propose a hatch system to be approved by the Owner's Representative.
- * The floors in the stbd hull (crew side) will be enclosed to the kick board for easy cleaning. Drains to the gray water system with P-traps, will be provided in the galley and laundry floor.

12.03.04.01 Floor and Bulkhead Veneer

Planking for floors and bulkheads will be relatively clear of knots. Plank ends will be staggered in a random pattern and lengths will be maximized.

Seams for floors and bulkheads, whether butted and beveled or grooved, is to be determined.

The Builder will prepare a 4 meter x 4 meter sample of finished flooring for approval by the Owner's Representatives and interior designers.

12.03.05 Interior Doors

As per the Owner's interior designers specifications.

Toilet rooms to be undercut approximately 12 mm for ventilation.

All interior doors to have non-rattling door catch hooks.

The fire class rating for each door is contained on the Fire Insulation plan.

12.03.05.01 Door Hardware

As per the Owner's interior designers specifications.

12.03.05.02 Door Lock Sets

Numerous doors for the interior will be provided with lock sets. The total number and type are to be determined as per the Owner's interior designers specifications.

Note:

1. Some exterior doors and some interior doors may have remote control locks and sensors operating in conjunction with the security system.

12.03.06 Plumbing Fixtures

The plumbing fixtures are to be as per the Owner's interior designers specifications.

12.04 AREA DESCRIPTIONS

The interior area descriptions are as per the Owner's interior designers specifications.

12.05 ENGINE ROOMS AND TECHNICAL SPACE DETAILS

The execution of the engine rooms and technical space, including lazarettes, details will be showpiece finish. All equipment will be installed to provide easy access for maintenance, service and repair. If necessary, any interference will be made removable for service and repair access.

The main engines will be ordered as "Detailed" engine, having a high gloss paint, chrome and polished stainless steel accessories. The remainder of the equipment and component details will be highly detailed finishes with glass painted finishes and bead blasted, polished or plated metals.

The lazarettes and tender compartments will be finished to a high level of detail. In these 3 areas, hydraulic and other tubing and fittings will be polished stainless steels where visible. The Builder, in coordination with the Owner's Representative, will provide organized storage shelves, lockers or drawers where possible.

Other details to include:

12.05.01 HEAVY MAINTENANCE ACCESS

STRONG-POINT ATTACHMENTS WILL BE PROVIDED IN THE ENGINE ROOM DECKHEAD FOR HOISTS OF HEAVY EQUIPMENT, BEFORE THE ENGINE ROOM SOUND AND THERMAL INSULATION IS INSTALLED. LABELED ACCESS COVERS FOR THESE STRONG POINTS WILL THEN BE INSTALLED IN THE SOUND AND THERMAL INSULATION.

There must also be sufficient space between the engine mounts and bilge framing, to remove the main engine and generator oil pans, for access to the crankshafts.

12.05.02 Engine Room & Bilge Framing

All intersections of the engine room transverse and longitudinal framing will be provided with timber holes, to allow for drainage of bilge water. These timber holes should be provided in the framing from the keel, to 500 mm above the waterline.

12.05.03 Engine Room Deck Grating

The engine room deck grating will be anodized aluminum plate, with a diamond pattern. These plates should be fastened to the deck grate framing with quick acting fasteners. The fasteners are to be the 1/4 turn, aircraft Dzus (pronounced Zeus) fastener. A rubber, insulating tape should be applied to the bottom of the grates, where it contacts the deck grate framing to prevent metal-to-metal contact between the grate and frames.

The deck grate support framing should be of aluminum, and of sufficient cross section to support the deck grates. The perimeter framing for the deck grates will be the same color as the

deck grates. (Note: This is to prevent paint from being clipped off these frames when the grates are removed for repair/inspection.)

12.05.04 Engine Room Guards & Railings

Guards/rails should be positioned around all operating equipment. These railings will be mounted to the deck grate framing with quick acting fasteners, to provide easy removal during repairs.

Guards should be placed around all exposed rotating items such as bells, pulleys and couplings.

These guards and railings should be of a high quality material such as high polished stainless steel. In the interest of weight, they can also be constructed of anodized aluminum. Composites of carbon fiber/Kevlar are also acceptable materials.

The railing system above each main engine will incorporate a work bench with tool storage. Final design is to be coordinated with the Owner's Representative.

12.05.05 Drip Trays & Save-alls

Drip trays should be installed, under the main engines, and generators. These should be of a high quality material, but not high polished stainless steel - as they are difficult to clean. Bead blasted stainless, or anodized aluminum is recommended for this application. A composite material can also be used. Cleaning of the drip trays will be accomplished using a small hose attached to the oily water separator.

All pumps will be mounted on a save-all tray, with at least a 25 mm lip. These trays should have drain holes and plugs. These trays can be of bead blasted stainless, anodized aluminum, or composite.

12.05.06 Engine Room Piping Finish

All stainless steel piping in the engine room is to be installed with a bead blasted finish.

Steel, alloy, and bronze and copper alloy piping will be painted, with a high-gloss, two-part polyurethane paint system. All welds on this piping will be ground flush, filed and faired, before painting. Piping should protrude from threaded fittings, at least 2 threads, but no more than 3 threads.

Gaskets should be the same diameter as the flange they are installed on, and shall not protrude past the circumference of the flange.

Piping brackets and supports should be of a high quality material, but not high polished stainless, as they are very difficult to polish. Bead blasted stainless, or painted aluminum is more suitable. Piping will be insulated from brackets so as to minimize vibration to the hull or mounting structure.

12.07 Fasteners

All fasteners for technical equipment and their mounting will be stainless steel. Fasteners include nuts, bolts, washers and lock washers, and cap screws, machine screws and Allen head bolts. Some equipment (such as high-pressure air compressors) are supplied with heat treated, aluminum alloy fasteners. These fasteners must be anodized.

12.08 Lighting

There must be good lighting in all technical spaces. All lighting installed in the engine room should be enclosed in splash proof fixtures. Lighting in the bilges should be in waterproof fixtures. Extra lighting should be provided at workbenches, and over the main switchboard.

This lighting will be fluorescent lighting above the deck, and incandescent lighting for the bilges. It is important to avoid a mixture of many different styles/sizes of bulbs, as storage of spare bulbs is sometimes difficult.

12.09 Manholes & Hatches

Within the engine room and technical spaces, the access hatches to all tanks will be fastened with highly polished stainless steel bolts, or with a single bolt dog. The studs for these bolts should protrude through the bolt by at least 2 threads, but no more than 3 threads. The manhole covers will be provided with handles, for easy removal, and they will be labeled, in regards to which tank they service.

12.10 Labels

All equipment should be identified with a label that is securely fastened to the equipment, or near the equipment. All junction boxes, switchboards and circuit breakers will also be labeled. These labels can be engraved, polished stainless steel, or engraved thermo-plastic. The specifications already detail that all piping is to be labeled and color-coded. SOLAS regulations for label and color-coding will be followed.

12.11 Paint

The engine room and technical spaces should be finished with a high quality, high gloss, two-part polyurethane paint system. This includes the bilges and bilge frames. For ease of maintenance/inspection/repair the paint color should be white or as determined by the owner's representative.

There shall be no sharp edges on the bilge framing, and all welds should be ground flush.

All the mechanical equipment will be painted with the same, high gloss finish. Hoses and electrical wiring will not be painted.

Toolboxes and shelving should also be painted with the same high gloss finish.

12.12 Thermal & Sound Insulation

The engine room will be isolated from the accommodation with thermal and sound insulation. In addition to the Silent Line specification:

Some engine room piping requires thermal insulation, for efficient operation. This piping includes:

- * HVAC chilled water
- * Domestic fresh water (hot and cold)

The specified insulation for both these systems is 20 or 22 mm Armaflex pipe insulation. All seams in this insulation should be glued, and then these seams should be covered with a glued strip of Armaflex insulation. No self-adhesive tapes are to be used.

All bends of greater than 25 degrees are to be mitered and glued. All insulated piping that is located in the bilges should be painted with Ammatex, Armatexish 10N. Note that other paint systems will damage the insulation.

- All HVAC chilled water piping will be insulated, to avoid excessive condensation.
- All domestic fresh, hot water piping will be insulated, to avoid excessive thermal loss.
- Hot water and HVAC chilled water piping should be insulated for the entire piping runs.
- The domestic fresh, cold-water piping is to be insulated in the engine room compartment, only.

12.12.14 Piping Architecture

The piping runs through out the vessel must be designed and installed in a carefully organized manner. Piping runs in bilges and along bulkheads should be stacked vertically, and never horizontally. The design of the piping runs is to be finalized and approved by the Owner's Representative before the installation begins.

13 EXTERIOR CONCEPTS

The exterior concept of the yacht is to be a low profile hull with long curving profiles to complement the naked rig. The superstructure is unique, providing dramatic style to the exterior. 180° windows will provide natural light to the salon.

Hull portholes will be flush mounted. The paint surfaces are to be a high gloss finish, highlighted with highly polished stainless steel railings and deck fittings.

13.01 Decking System

The teak decks are to be 12 mm and suitable for a yacht of this magnitude. The primary intent is to minimize weight of the decking system, but also not to sacrifice the visible appearance and durability of the system. A planking styling plan will be supplied by the design team. The Builder or sub-contractor may propose alternative styles (patterns) for consideration. The following conditions will apply to the decking system:

- The planking will be a minimum of 63.5 mm (2.5") wide and will be of a natural finish with black caulking.
- Butt and joints are to be staggered and consistent between port and starboard sides.
- Margin boards are to be 75 mm (3") wide.
- Hatch and hardware boards are to be 75 mm wide.
- Decking will be rubbed into the margin boards where necessary.
- The transition under kick spaces is to be a radius to a higher level than the planking.

The teak decking will not come up to the walls or edges but gutter drainage will be provided: locations and details to be determined on a drawing from the architects.

13.01.01 Decking System Areas

The decks have the following wooden areas:

• Flybridge deck;	92 m ²
• Forward terrace;	26 m ²
• Aft stairs;	30 m ²
• Main deck;	126 m ²
• Tuna area;	274 m ²

13.02 Flybridge

Sailing helms and operation of the vessel's sailing systems are located on the flybridge. Port and starboard helms will be equipped to monitor and control the vessel under sail and power. The helms will also be the main maneuvering stations.

The helm consoles will be a low profile with vertical face for mounting of control screens and monitors. The flat section will have sailing and maneuvering controls. There will be a center mounted gyro repeater. A detailed plan will be provided by Architects.

The upper deck will also be used for entertaining and relaxation. Access from the main deck will be up a port side stairway. It will be enclosed by a cloned bulwark, which tapers off to a low profile.

13.03 Forward Deck

The forward deck provides a private exterior lounge area for the owner and VIP cabins. Between the hulls, extending to the forward beam, is a web decking providing sail handling area. Just forward of the nacelle, the mooring equipment is covered with a deck that forms a terrace for the owner's suite.

13.04 Side Decks

The deck is arranged with flush cabin hatches and deck lockers for fuel fills, as described in "T05_deck_hatches_and_lockers" drawing.

13.05 Aft Main Deck

The aft main deck is arranged for relaxation and entertaining. Forward, there will be wide salon doors openings in the aft deck. There will be a large fixed sun bed with lockers under with the possibility to partly transform it into an aft facing seating. There will be a selection of loose dining tables and chairs that can be utilized to suit the entertaining mode. The tables will be hinged to function for cocktails or dining. A good portion of the forward aft deck area will enclose with enclosure and be air conditioned when desired.

There will be side deck covering lockers with various storage and technical equipment areas.

The main deck overhead will be made from lightweight panels and arranged with direct, indirect lighting and acoustical systems to be determined.

Large flush deck hatches are positioned for access to the tender locker, and other storage uses.

13.06 Railings, Stanchions & Wire

Railings and stanchions are described in "Gen_T04_stanchions & railing". Architectural drawing.

Top railing wire to be a minimum of 1000 mm above deck level. Design detail to be defined.

- All railing is to be 38 mm polished 316L stainless steel and styled according to the drawings.
- Pulpits will have a teak-grating seat on the mid railing. Design detail to be defined.
- The main deck stanchions will be 32 mm diameter polished stainless steel lifeline stanchions with ball on top, mounted on the side deck, at max intervals of 2200 mm in insulated spigot bases. All bases are to be fitted with drains as appropriate to prevent the collection of water.
- There are to be port and starboard lifeline gates with (4) stanchions and bases each side.

13.07 Air Intakes and Outlets

Special attention should be paid to the integration of all air in and out of the vessel. The final designs are to be approved by Architects.

13.08 Hatches

Deck hatches will be flush mounted, and are listed in "Gen_T05_deck hatches and lockers" Architects drawing.

13.09 Awnings and Dodgers

Awnings and dodgers will cover the flybridge, as described in "Gem_T12_flybridge_planist" Architect's plan.

13.10 Upper Deck Stairway

The stairway to the upper deck will be fitted with indirect courtesy lights and banister railings. Stair treads will be covered with the deck system timber and styled consistent with the decking system. Indirect lighting will be let into the underside of the stair frame.

13.11 Exterior Furniture

The exterior furniture will be supplied by the interior subcontractor. Inventory is to be determined.

13.12 Jacuzzi

A "Bradford Spa" or equivalent spa will be fitted on the upper deck. The spa will be built to the dimensions as provided in the plans and arranged with:

- * Water heaters
- * Fresh water fill connections
- * Circulation filters and massage jet systems
- * Gutter water catch
- * Side seating
- * Internal seating
- * Underwater lights
- * Drain to the hull tank as required by the Rules

14 NOISE & VIBRATION CONTROL; STRUCTURAL FIRE PROTECTION

The complete package on noise and vibration control has been designed and provided by SilentLine BV. This package contains the following items:

- Complete set of preliminary detail insulation installation drawings.
- Preliminary weight calculation.

The Builder may select SilentLine BV, or another noise and vibration consultant to work with, but with the understanding that the noise and vibration targets are to be achieved. SilentLine BV states they will guarantee the sound and vibration targets if under contract to the Builder.

14.01 Noise Targets

The following noise targets are to be achieved.

14.01.01 Noise Targets at Anchor Condition

Measuring conditions:

- Measuring position in the center of the cabin or room at 1.60 meter above floor level.
- All doors to be closed.
- Cabin or room completely finished.
- Air conditioning at normal speed (fan speed 2).
- Normal secondary machinery operational.
- Loose hold equipment not taken into account.
- Sound sources other than the generator set, normal secondary machinery and air conditioning is not taken into account.
- Sea state 1
- Wind speed (Beaufort 3)

At anchor condition, noise targets to be achieved [dB(A)].

• Saloon :	38 - 40
• TV room :	40 - 42
• Owner & VIP Suite:	36 - 38
• Guest cabins, port bunk:	38 - 40
• Crew cabins, stbd hull:	42 - 45
• Galley:	43 - 48 (extraction fan not running)
• Crew mess:	45 - 48

14.01.02 Noise Targets at Cruising Condition (80% MCR of the main engines)

Measuring conditions:

- Measuring position in the center of the cabin or room at 1.60 meter above floor level.
- All doors to be closed.
- Cabin or room completely finished (carpet, beds etc.)
- Air conditioning at normal speed (fan speed 2).
- Normal secondary machinery operational.
- Loose hold equipment not taken into account.
- Sound sources other than the main engines, gearboxes, propulsion propellers, generator set, normal secondary machinery and air conditioning is not taken into account.
- Sea state 1

- Wind speed (Beaufort 3)
- Rudder angle maximum 2 degrees.

Cruising condition, noise targets to be achieved [dB(A)].

• Salon :	54 – 56
• TV room :	56 – 58
• Owner & VIP Suite:	48 – 50
• Guest cabins, port hull aft:	56 – 58
• Guest cabins, port hull fwd:	54 – 56
• Crew cabins, starb hull:	58 – 60
• Galley:	58 – 60
• Crew mess:	56 – 58

14.01.03 Acoustic Privacy

The requirements is for excellent acoustic separation between the various partitioned areas. Noise reduction from one space to its adjoining space is to match the isolation requirements of the "Sound Transmission Class" (STC) as given below. Achievement of the required isolation requires special constructions (insulated walls, gasketed doors and silenced vent passages). All privacy partitions must be sealed to the deck head and penetrations traversing privacy bulkheads must be sealed.

Between compartments:	STC:
• Crew : cabin to cabin	35
• Crew : cabin to corridor	35
• Owner - VIP : cabin to cabin	40
• Owner - VIP : cabin to corridor	35

The above mentioned STC-targets are to be studied by means of the SEA model. The composition of the separation wall(s) are added to model as well as the cabin dimensions, finishing and reverberation time. This means that eventual modifications can be added in an early design stage.

14.02 PRELIMINARY Insulation Plans

The following (attached) preliminary insulation drawings have been designed by Silent Line BV. Any alterations to the schedule or substitution of materials are to be approved by Silent Line BV and the Architect. A final insulation plan will be designed following the completion of the Statistic Energy Analysis (SEA) study.

14.02.01 Lazarettes and Tender Compartments

The lazarettes will be insulated from thermal point of view. See detail insulation drawing "G-L-d-1_v1_tender compartment" and "G-L-d-8_v1_aling compartment".

The tender compartment will not be insulated.

14.02.02 Engine Rooms

These areas are insulated from noise, thermal and See point of view (A-60). See detail insulation drawing "G-L-d-4_v1_engine room" and "G-L-d-12_v1_engine room".

14.02.03 Crew Quarters

These areas are insulated from noise point of view. See detail insulation drawing "G-Md-6_v1_crew mess room"

14.02.04 Laundry

These areas are insulated from noise and thermal point of view. See detail insulation drawing "G-Md-7_v1_laundry and crew forward"

14.02.05 Galley

These areas are insulated from noise, thermal and fire point of view. See detail insulation drawing "G-Md-1_v1_galley"

14.02.06 Owner & VIP Staterooms

These areas are insulated from noise and thermal point of view. See detail insulation drawing "G-Md-4_v1_VIP bedroom" and "G-Md-5_v1_owner bedroom"

14.02.07 Salon & TV Room

These areas are insulated from noise and thermal point of view. See detail insulation drawing "G-Md-3_v1_saloon" and "G-Md-2_v1_lower saloon"

14.03 Vibration Targets:

The maximum vibration level, measured at the ship structure, may not exceed the ISO level of 4 mm/sec [RMS] with the yacht cruising at 80% MCR output.

The maximum vibration level, measured in the accommodation areas (suites etc. not included), may not exceed a level of 1.0 mm/s [RMS] with the yacht cruising at 80% MCR output. At anchor condition, the maximum vibration level may not exceed 0.5 mm/sec [RMS].

Structural analysis are to be performed by Silent Line BV, or the Builder's selected consultant, using Finite Element Analysis software (Nastan under Windows, or equal) to avoid resonance and to ensure the above mentioned allowable vibration level of 4 mm/s. This study is combined with mobility calculations on the engine and gearbox foundations, framing underneath the generator sets and the interaction between the propulsion propeller(s) and the hull plating above the propeller(s).

Cabin surrounding (finishing floor, liners, separation walls and ceiling) must be installed as a box-in-box construction meaning that a direct contact between the structure and the cabin surrounding is avoided. This is to ensure the maximum allowable vibration level of 0.5 mm/s [RMS].

Whirling and axial vibration calculations are also foreseen using the above mentioned Finite Elements Analysis software.

14.04. Materials:

The materials and surface areas are as listed in the attached spreadsheet and the installation is to be in accordance with the drawings as listed in part 14.02.

The material lists exclude the interior items as listed below:

- Hull liners,
- Bulkhead liners,
- Separation walls,
- Ceiling

14.05. Supervision During the Build Stage:

Supervision for a qualified person is required for the installation in order to assure that the noise targets will be achieved. If under contract to the Builder, SchenLine BV will provide the following services:

1. Visits to the yard, during the entire building stage, are included in our package. The following main visits are:

During the building stage:

- Measurements on the ship structure are foreseen in order to check the natural frequencies of local structures like bulkheads, deck structures etc. This to make sure that the vibration targets as stated in topic 14.03 are not exceeded.
- During the denouage of the insulation system:
- Visits are foreseen in order to make sure that all materials are installed in accordance with our detail insulation drawings. This to make sure that the noise targets as stated in topic 14.01.01 – 14.01.02 are not exceeded.

2. During the denouage of the interior:

- Visits are foreseen in order to make sure that all materials are installed in accordance with our detail insulation drawings. This to make sure that the STC targets as stated in topic 14.01.03 are not exceeded.

14.06. Attachments

The following documents are attached and are considered part of this specification:

- Preliminary_Lower deck_weight_SL_version03 wcorr
- Preliminary_Main deck_weight calculations_v3

15 DECK EQUIPMENT

The deck equipment is to be according to deck layout proposal by the Architect. All deck fittings are to be installed with adequate stiffeners and bucking plates to support the loads and be watertight.

All deck equipment is to be of a similar manufacturer with a consistent type of finish, i.e.: polished stainless steel. Fasteners should be resistant to corrosion and to be Allen head or square drive.

15.4 WINCHES**15.4.01 Anchor Winches**

See part 07A and drawing: *Gem_T02_anchor arrangement*

15.4.02 Mooring Winches

See drawing: *Gem_T03_mooring arrangement*

There will be four (4) mooring winches mounted bow and stern, port and starboard, of suitable size for handling the mooring lines. These will be located in enclosed lockers along with the cleats. The lockers will have red lights for illumination.

**MOORING
WINCHES**

		Position	Nom Rating	Power	Weight
1	Muir VC8000	Port aft	3636 kg	Hydraulic 28bars@175 bar	121 kg
1	Muir VC8000	Starb aft			
1	Lewmar 8813ST*	Port fwd	4545 kg	Hydraulic 185 bar	54 kg
1	Lewmar 8813ST*	Port fwd			

* To be also used for spinnaker sail handling.

15.4.03 Sailing Equipment

The winches will be hydraulic. Mast and deck mounted winches will have stainless steel bases and self-winding caps. See drawing *Gem_V03_deckplan* for details.

Manufacturer: Lewmar

Number	Position	Location	Model	Power	Weight
2	Solent Sheet	In coach roof	LMS 125	Hydraulic	365 kg each
2	Staysail Sheet	In coach roof	LMS 125	Hydraulic	387 kg each
1	Mainsail Sheet	THD	LMS 111	Hydraulic	195 kg
1	Mainsail Halyard	Fwd cross deck	LMS 125	Hydraulic	387 kg
2	Furcassils Sheets	Upper deck	122 AHSTOR	Hydraulic	202 kg each
2	Mast	On mast	122 AHSTOR	Hydraulic	202 kg each

Note that the foresail and mainsail luffyards will not be loaded while sailing. The balyard winches will hoist the sail and the headboard car will be locked in place. Luff tension will be set from deck level via a hydraulic Cunningham.

15A.03.01 Boom Controls

No.	Purpose	Type	Location
1	Mainsail topping lift	A250-040JXX	Internal boom
1	Mainsail outhaul	A250-090JXX	Internal boom at gensecock
1	Mainsail traveler	A254-110JXX	Upper aft deck coaming
1	Boom preventer	A250-030JXX	Internal boom

15A.03.02 Winch Controls

Captive reel winch control positions are at each exterior helm station and locally at the winches.

All mast and moving winches are to be foot switch controlled, located at each winch station. Winch controls for the flybridge deck will be recessed into the coamings.

Each flybridge helm will have an emergency stop button for the hydraulic winch power pack.

15A.03.03 Winch Power

Power is to be provided by a custom hydraulic power pack system as described in the part 07H.03 of this specification.

15B BLOCKS & HARDWARE

15B.01 Block List

All blocks and sailing hardware are listed in the attached spreadsheet:
Gemini_hardware_listng.xls

15C HATCHES, WINDOWS AND PORT HOLES

The windows, hull ports and cabin house ports are to be in accordance with Class and MCA requirements.

15C.01.01 Structural Glass

Structural glass is listed in part 02

Main salon windows

Nb	Average Height	Area	Thickness	Radius of curvature	
				Bottom	Top
	mm	m ²	mm	m	m
2	850	4.8 each	Tbd	29.2	29.6
2	1100	2.9 each	Tbd	2.47	2.38
2	1200	3.8 each	Tbd	23.6	24.6

Forward windows

Nb	Height	Width	Total Area	Thickness
	mm	mm	m²	mm
3	1100	1900	13	Tbd

Aft salon

The aft salon bulkhead will be all glass with a combination of fixed and sliding panels.

Nb	Height	Width	Total Area	Thickness
	mm	mm	m²	mm
	2200	8350 full	18.4 m²	Tbd

13C.01.02 Portlights & Portholes

Portlights and porthole locations are as per drawing: *Gem_T116_hull_portlights*

13C.02 Window Shading

All main salon, upper deck salon and owner's suite windows and door glass shades will be specified by the interior designer.

13C.03 Window Wipers

Aft forward pilothouse will be provided with electric window wipers and wash system in way of the interior helm station.

- Manufacturer: Hepworth
- Type: 30NM; pantograph sweep
- Number: 6
- Power: 120/60
- Weight: 8 kg each

13C.04 Deck Hatches

All deck and locker hatches are listed on drawing: *Gem_T05_Deck Hatches & Lockers*.

- All composite hatches are to be flush with concealed hinges.
- All lens hatches are to have stainless steel frames
- Manufacturer: Freeman Marine or equal

13D COVERS, BIMINIS, DODGERS & CURTAINS**13D.01 Main Deck Coverings**

The aft main deck is to be enclosed with fiberglass curtains and will be an air conditioned space (port, side and aft enclosure). The side curtains should extend from the aft roof bulkhead 5.2 m.

The curtains should be furling into the overhead.

The client is also considering a roll down Venetian blinds type protection at the foremost aft end of the flybridge to provide shade to main deck cockpit. The design will be provided by the Architects.

15D.02 Flybridge Bimini

See drawing: *Gem_T12_flybridge_bimini*

A hard top bimini will protect two thirds of the flybridge deck area. It will be built in composite with aluminum support pillars as per the Architects drawings.

The Builder will propose a removable enclosure system for the top.

15D.03 Flybridge Dodgers

The primary function will be to protect the helm stations from wind and rain. The dodgers will fold up into the bimini. It will be built according to the Architects design.

15D.04 Sail Covers

The head sails and mainsail will be provided with sun covers.

Color and materials to be the Owner's choice.

15D.05 Protective Deck Runners & Covers

Deck runners are to be provided to protect the decking. There will be a fastening or securing system provided that is to be discrete. Runners will be provided for:

- Upper deck
- Main aft deck traffic areas (defined as direct paths from ladders and passageways)
- Main salon & TV room
- Forward athwartships passageway and stair

Color and materials to be selected.

15E DECK HARDWARE

15E.01 Stanchions

15E.01.01 Materials

The Builder will quote for 2 stanchion materials:

- Option 1: Polished 316L Stainless steel
- Option 2: Titanium

15E.01.02 Main Deck

See drawing: *Gem_V04_stanchions & railings*.

The main deck stanchions will be 32 mm diameter with ball on top, mounted on the side deck, at max intervals of 2200 mm.

There are to be port and starboard lifeline gates with (4) stanchions and braces each side. Top course to be a minimum of 1000 mm above deck level.

15E.01.03 Upper Deck

See drawing: *Gen_V04_stanchions & railings*.

The upper deck will be surrounded by a molded bulwark with railings to a total height of 1000 mm. Railing section will be of suitable size and section for aesthetics. Details to be approved by the Owner.

All stairway railings are to be 38 mm diameter to a total height of 1000 mm.

All stanchions will be mounted in or on insulated spigot bases to protect the paint finish and prevent contact between the dissimilar metals. All bases are to be fitted with drains as appropriate to prevent the collection of water.

15E.02 Pulpits

Two pulpits, 2, are to be made out of 38 mm tubing as per the drawing. Pulpits will have a teak seat and rail.

15E.03 All Railings

All railings are to be made out of 38 mm tubing, suitable oval section or teak cap rail. Railings are to include brackets for MCM and Hineslawe buoy.

All railings will be fitted with tension openings as shown in the drawings.

15E.04 Railing wire

The vessel is to be surrounded with railings in accordance with the Rules. A minimum of 3 courses of railings are required.

- Upper wire is to be -10 standard rod
- Lower courses is to be -6 standard rod
- Railing passages will be uncoated wire and have pelican hooks or other suitable opening fixtures
- Rod end wires are to have end fittings and tension adjustment

15E.05 Deck Fittings & Mooring Hardware

Deck fittings and mooring hardware are shown on drawings.

Gen_V03_Deck Plan and
Gen_T03_mooring arrangement

15E.06 Netting

Netting consisting of flat webbing will be fitted between each hull and longeron and between the forward beam and the longeron.

A suitable perimeter fastening system will be provided for the full perimeter of the netting.

15E.07 Other Fittings

Other fittings will be provided as follows:

- Stainless steel bow or eyes in front of the mast for hooking free bulyards.
- One (1) SS base socket on the upper deck aft railing with one carbon fiber flagpole.
- SS chain fittings in the flybridge deck, main deck and forward well deck as necessary.
- Eye fitting at each forward beam hold foundation for attachment of the anchor bridle.

Note that there will be other miscellaneous fitting required.

15F BOARDING LADDERS

15F.01 Passerelles

See arrangements on drawings: *Gem_T04_aft passerella* and
Gem_T11_side passerella

The yacht will be provided with two carbon fiber (2) hydraulic passerelles that retract into the transom and starboard side. The passerelles will be provided by C-Quip. The passerelles will be fitted with:

- Call button
- Courtesy Lights
- Removable Railings
- Teak walkway

15F.01.01 Starboard Side Passerelle

The starboard passerelle will be retracting into the side and slew to 50° fwd and aft. The passerelle should articulate to -40° for use near the waterline or at facilities, which are higher. It should therefore be equipped with pivoting steps.

15F.02.02 Port Aft Passerelle

The port passerelle will be retracting into the transom. The passerelle should extend a maximum of 3 m and articulate to +/- 15-15° for use near the waterline or at facilities, which are higher.

16 INVENTORY16.01 Builder Supplied

The following additional inventory will be provided by the Builder and installed or placed on board with appropriate storage arrangements:

- SCUBA Compressor as listed in part 07F.03
- Safety equipment as listed in part 17
- Mattresses by Hankraft Mattress Co., or equal; as sized in the interior concepts.
- Two (2) outboard motor storage racks in stbd lazarette
- Two (2) boson's chair with tool pockets provided
- One (1) swimming ladders, made of stainless steel with deck steps for aft platform which locks into place, to ensure no movement
- Two (2) telescopic boat hooks made of aluminum.
- Two (2) anchor rode bridals at the bows with chain claw for the anchor chain. Ten (10) appropriate sized inflatable fenders
- Ten (10) mooring lines sized to the satisfaction of the Administration. Suitable eye splices will be at one end for the mooring arrangements. Ends will be finished to prevent fraying.
- Spare parts inventory for main engines, generators, water strikers, fuel & purifier systems, waste treatment systems, hydraulic systems and other spare parts to be recommended by the equipment suppliers.

16.02 Owner Supplied

The following items will be supplied by the owner and installed by the Builder. The Builder shall be responsible for unloading, uncrating, receiving, storing in a suitable manner and installation on the vessel at the proper times these items and any other articles consigned to the Builder for the Owner's account for use in the vessel.

That which is sent to the Builder will be installed by the Builder with all necessary foundations, connections and related equipment. Suitable lockers, drawers or chocks shall be provided as required. No additional charge shall be made for this service.

Only the items specifically listed below will supplied by the Owner and anything else required for a complete vessel of the type described shall be provided by the Builder.

- Electronics as listed in part 13
- Loose deck furniture listed in part 13 Exterior Concepts
- Sails, as listed in part 23
- Dive equipment as listed in part 23
- Tenders as listed in part 24
- Exercise equipment
- Type III, IV and V personal flotation devices for small craft
- Safety harnesses
- Other water toys TBD
- Tools for deck and engine rooms
- Cleaning equipment
- Required Regulatory publications, paper charts, guides, etc.
- Desired audio, video and printed media
- Medical kits and inventory
- China, table settings, flat ware, crockery
- Pillows, bedding, linens, towels, etc.
- Crew uniforms

17 SAFETY EQUIPMENT17.01 General

The life saving equipment inventory is to comply with MCA requirements with the following minimum equipment provided:

17.02 Life Rafts

Life rafts will be installed in accordance with drawing: Gens_C01 & C02_Safety_plan.
Dimensions and weights are of the container pack.

- Manufacturer: Viking
- Model: EO DK
- Number: Four (4)

Each life raft to be fitted with SOLAS "A" pack. A placard giving instructions for launching and inflating the life rafts must be posted in a conspicuous place.

Emergency lighting at the life raft stations will be provided as required by the regulations.

17.03 Personal Flotation Devices (PFDs)

The Owner will supply personal flotation devices.

Storage of PFDs is to be in accordance with MCA regulations.

17.04 Safety Harnesses

Safety harnesses will be Owner supplied items.

17.05 Ring Life Buoy

Three (3) life buoys, or number as required by MCA regulations, are to be provided and mounted in accordance with MCA regulations.

17.06 Flares

Distress signals will be provided in accordance with MCA regulations.

17.07 Mast Overboard System

There will be a run overboard system(s). The overboard modules, in a container mount location to be determined.

- Manufacturer: TBD
- Type: TBD
- Number: TBD

17.08 Medical Kit

The medical kit will be Owner supplied.

19 PAINTING WORK

The exterior and interior paint systems are to be an International Paint system from filler and primer systems to the finish coats. If the Builder or paint contractor prefers an alternative system, this is to be approved by the Owner's Representative.

Paint colors are to be selected by the Owner. Presently, the topsides will be a dark navy blue and super structure (s a) white. Boot top and other accents are not yet determined.

In consideration of developing paint technology, the Builder, and the Builder's paint subcontractor, if applicable, will consult with the paint system supplier for the best type of system to apply. The Owner's Representative may provide an independent paint consultant to review, inspect and recommend on the paint system and process.

Any exterior finish coats are not to be mechanically polished.

The quality of the exterior paint system is to be a *Super Yacht Finish*, as noted in the below table. The Builder will provide the Owner's Representative with a sample of high gloss vertical and horizontal surfaces, plus a proposed standard to be within the tunnel.

Hull Area	Gloss range Sec notes	Dust Particles per sq decimeter	Surface texture	Fairness	Sags & Runs
Exterior topsides Outboard and inboard surfaces and super structure	87-90% @ 60°	8 @ 0.3 mm	<15 or Reference panel	Judged throughout construction process	Not allowed except with approval of owner's representative
Deckhouse tops	85-90% @ 60°	12 @ 0.3 mm	15-20		Same
Tunnel bottom	80-85% @ 60°	10 @ 0.3 mm	8-12		Same
Inspection Method	Gloss meter	Magnified visual	Visual comparison	Visual	Visual

Gloss Range Notes:

1. Gloss measurements are to be taken over 5% of the total surface area, divided into 1 m² sections.
2. Each 1 m² section will be measured at 5 spots and the average calculated.
3. Each spot will have the average of 3 readings taken within 5 cm.
4. The surface areas will be divided over types of surface: horizontal, vertical, sloped, exposed, non-exposed and deck areas (ie: upper deck, main deck, etc.)
5. None of the 5 spot averages shall be below 95% of the specified gloss value. One of each of the readings for a spot average may be below 95% of the specified gloss value, but not below 80% of the specified value.
6. For each 1 m² area, the spot averages shall not be below the specified gloss value.

19.01 Painting Work Hull Inside

All surfaces are to be disc ground to remove all sharp edges and washed to remove contaminants.

All wood is to be fully sealed or suitably treated on all sides to prevent ingress of moisture and rot.

All woodwork that has to be varnished will be varnished with two component varnish. Finish coat to be as directed per the designers drawings.

All interior cabin area paint work is specified in part 12 Interior Concepts.

- | | |
|-----------------------|---|
| ▪ Hull Inside: | Not painted behind insulation. |
| | All bilges and other areas are painted. |
| ▪ Engine room: | Not painted behind insulation. |
| | All bilges are painted. |
| ▪ Sump Tanks: | Cerumkote |
| ▪ Water Tanks: | Cerumkote |
| ▪ Fuel and oil tanks: | Not coated. |

19.01.01 Hull Interior Colors

- | | |
|----------------------------|-------------------------------|
| Lockers above deck plates: | Off white, or Owner's choice |
| Bilges below deck plates: | Light gray, or Owner's choice |

19.02 Hull Exterior

The following surface areas are preliminary:

- | | | |
|--|-----------------|---------------|
| • Hull below water line: | 500 sq meters | 5,382 sq ft. |
| • Hull and superstructure above waterline: | 1,265 sq meters | 13,616 sq ft. |
| • Wet deck tunnel: | 266 sq meters | 2,863 sq ft. |

19.02.01 Hull, below waterline, Surface Preparation - Aluminum Substrate

- 1 Prior to sandblasting, it is imperative to clean all surfaces with Interlux 202 Fiberglass Solvent Wash for the removal of wax, silicone and other surface contaminants. Using cleaned dry rags, saturate with Interlux 202 Fiberglass Solvent Wash and scrub the surface thoroughly. Before the solvent dries, wipe up completely with separate clean, dry rags. Work in small, easily reachable areas at a time. Repeat this procedure if necessary to ensure all surface contaminants are properly removed.
- 2 An efficient way to tell when all contaminants residue has been removed is by spraying the entire hull with water. If the water beads up, contaminants are still present. Repeat step 1 procedure until all the water "sheets" completely over the surface.
- 3 Sandblast all aluminum surfaces to clean bright, near white metal finish with medium mesh Silica Sand. Blow down the entire substrate with a clean air line using a clean rag to remove all blasting residue. *Within (1) one hour of sandblasting, immediately apply the first coat of A (see step two below).*
- 4 If sandblasting is not possible, disk grind the entire underwater hull surfaces with 24 grit grinding discs. Thoroughly wash all standard surfaces once again with Interlux 202 Fiberglass Solvent Wash using the "two rag wipe down method" and changing rags frequently.

19.02.02 Application procedure

The application procedures will be determined by the paint system supplier in cooperation with the Owner's Representative and his consultants.

19.02.03 Underwater Hull Fairing

If extensive underwater hull fairing is necessary, it will be a light weight system, applied with a proper tie coat in agreement with the Architect.

19.03 Hull Outside, above waterline19.03.01 Surface Preparation - Aluminum Substrate

The application procedures will be determined by the paint system supplier in cooperation with the Owner's Representative and his consultants.

19.03.02 Topcoats

The application procedures will be determined by the paint system supplier in cooperation with the Owner's Representative and his consultants.

19.04 Varnish Work on Deck

Varnish work on deck to be *full grain, hi gloss finish*.

20 SPARS

Please refer to the Architects drawings for accurate dimensions of the spars, sail plan and rig loads – drawings:

- * *Gem_Sail Plan*
- * *Gem_Rig Loads*
- * *Gem_Deck Plan, Fittings & Hardware Plan*

20.01 Principal dimensions

The preliminary sections are as follows:

- * Overall length: 53000
- * Section depth: 1100
- * Section width: 700

The following are estimated from the sail plan:

- * P 47275
- * E 15485
- * I 45050
- * J 12635
- * I_x 7.6e 14 N.mm²
- * I_y 6.2e 14 N.mm⁴

20.02 General Concept

The spar and boom will be constructed of carbon fiber. The mast will be without spreaders, have a tapered top section and have a ball & socket steel fittings with pivot stops. Note that the rig will be jacked from the deck and appropriate structure is required.

The boom will have an internal hydraulic topping lift and outhaul systems with separate clewbars for hydraulic, electric and rigging systems. The boom will be a 'jerk overboard' style to contain the sail when reefed or duffed.

All hardware is to be installed with suitable insulating or barrier materials to prevent corrosion between the components.

The mast is to be arranged with steps and a platform at the height of the gooseneck.

The finish of the mast and boom are to be to the owners' choice of colors.

Sheets and Halyards are listed in the part 22 Running Rigging.

20A. MAST COMPONENTS20A.01 Masthead

Carbon fiber tapered top section and masthead with: (to be confirmed with mast builder)

- * One sheave for main halyard (backside)
- * Two sheaves (port and starboard) for bow & chair lines (port and starboard)
- * Three all line for topping lift, main halyard purchase fix point, and spare
- * 2 sheave blocks for barge halyard

- 2 eyes for safety lines
- 4 retractable steps for masthead access.
- Ground attachment for lightning rod

28A.02 Mast Fittings & Hardware

The mast will be arranged with: (to be confirmed with mast holder)

- Gennaker lug tang with sheave and sheave box for gennaker halyard.
- Spinnaker lug tang with sheave and sheave box for spinnaker halyard.
- Headstay lug tang with sheave and sheave box for solent halyard.
- Inner forestay lug tang with sheave and sheave box for staysail
- Storm sail lug tang with sheave and sheave box for storm sail
- Two rails (port and starboard) with one traveler on each for gant line
- Two hydraulic (or manual) headsail halyard tensioners (solent and staysail)
- Shroud attachments.
- Port and starboard sheave boxes for lazy jacks.
- Cowling for port and starboard foredeck lights
- Cowling for deck lights for owner's terrace and ground tackle
- Internal vent pipe(s) for gray and black water systems
- Electrical conduit and connection box for wiring and electronics
- 2 mount brackets for radar arrays
- Required SS hydraulic fittings for boom hydraulics
- Sail track with headboard, headboard lock system and batton car system. Note: headboard to lock at full fill and reef point stations to remove load from halyard.
- Ground conductor for lightning protection - flat copper strap
- Lightning rod
- Boom gooseneck fitting
- Halyard and reef lines exits with SS chafe protection as per <Gem_deckplan>
- Refer to drawing <Gem_hardware_listing> in part 15-Deck Equipment, for clatch, jammers and cleats on mast

28A.04 Mast Lighting

Lighting is to be wired and installed to comply with International Regulations For Preventing Collisions At Sea, 1972, as amended. Lights mounted on the mast column to have suitable mounting brackets and protective guards. Light particulars are listed in part 16D.04 of this specification. The following provisions will be made for the electrical options listed below:

- White stroke light 360°
- Red 360° masthead light.
- Green 360° below masthead red light (night sailing)
- Steaming light on mast front
- Port & starboard forward deck lights
- Port & starboard anchor gear area deck lights
- Two under boom deck lights for fly bridge
- Controllable spot lights

Provisions to be made:

- Provide protective guards, supports and brackets
- Pulling of cables in mast
- All lights and their wiring

- All cables in conduit

20.A.05 Boom Components

The boom is to be carbon fiber with tapered end and fitted with:

- Gennaker fitting on a hydraulic cylinder fixed on the mast (to push boom from mast for outhaul trimming)
- Separate chambers for lines and electric wiring
- Separate chamber for stowing spare sail battens
- Three (3) inboard reef point systems with internal hook for each reefing line
- Captive winch for a 4:1 purchase mainsail sheet
- Internal boom preventer hydraulic cylinder
- Internal topping lift hydraulic adjustment
- Six (6) side lugs for lazyjack system
- Internal deck lights (2)
- Junction box for lights

20.B.01 Longeron

See drawing: *Gem longitudinal & transverse fwd beams*

The longeron is to be constructed of carbon fiber.

- Length: 8110 mm
- Section: 240 to 380 mm
- Weight: TRU

Fittings:

- Welddeck chainplate
- Forward transverse beam attachment
- Headstay attachment
- Staysail attachment
- Gennaker attachment
- Storm sail attachment
- Chambers for hydraulic lines and electric wiring
- Genlock strap for headstay
- Netting attachment
- Non-skid walking surface
- Access plates for internal systems
- Through beam inlet an outlet for spinnaker tack line adjustment, gennaker and staysail furling loop
- Custom roller (ref on deck plan)

20.C.01 Forward Transverse Beam

See *longitudinal & transverse fwd beams*

The forward beam is to be carbon fiber:

- Length: 10200 mm
- Section: 450 x 260 mm

- Weight: t, b, d, kg estimated

Fittings:

- Hull foundation attachments
- Longeron attachment
- Mastigale foundations
- Mastigale stay attachments
- Chambers for hydraulic lines and electric wiring (if required)
- Ground strap for headstays
- Netting attachment
- Access plates for internal systems

21 STANDING RIGGING

The final specifications are to be determined.

- The standing rigging will be a X (?) system.
- A data book will be made for all standing and running rigging.

The following is to be used as a guide:

Description	Length	Size
Main stay	50000	ROD # 320 min
Rod termination fitting		Tbd
High fatigue jaws		Tbd
Inner Stay	18000	Kevlar # 61 min
Rod termination fitting		Tbd
High fatigue jaws		Tbd
Main Shrouth	63000	Kevlar 220T min
Rod termination fitting		Tbd
High fatigue jaws		Tbd
Lower Shrouth	23000	Kevlar 79T min
Rod termination fitting		Tbd
High fatigue jaws		Tbd

22 RUNNING RIGGING**22.1 Halyards & Shears**

Preliminary halyards, shears and miscellaneous running rigging are listed in the attached spreadsheet 22-Sheets_Halyards V.03

All lines will be suitably terminated with faged and whipped ends.

22.2 Furling Systems

The sizes of the hydraulic furling systems and foils are to be confirmed with the manufacturer for the sail dimensions and rod sizes.

22.2.01 Headstay

Furling system for the Solent will be controlled at both Flybridge helm stations.

- Manufacturer: Reckmann
- Type: RF-90.6
- Power: Hydraulic
- Flow: 60 l/min
- Weight: 235 kg

Headstay Foil:

- Manufacturer: Reckmann

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- Type: Carbon
 - Profile: S8
 - Length: 47 m
 - Weight: 123 kg

22B.02 Staysail

Furling system for the Staysail will be controlled at both flybridge helm stations.

- Manufacturer: Reckman
- Type: RP-90-5.5
- Power: Hydraulic
- Flow: 45 l/min
- Weight: 98 kg

Headstay Furl:

- Manufacturer: Reckman
- Type: Carbon
- Profile: S7
- Length: 36 m
- Weight: 71 kg

22C RIGGING MISCELLANEOUS

The following will be provided:

- 2 hydraulic halyard tension cylinders for the:
 - 1 x Vang Type: TBD
 - 1 x Staysail Type: TBD
- 1 hydraulic reef rigging cutter
- 2 double ratchet handles for manual back up functions
- 3 single ratchet handles for manual back up functions

23 SAILS

Sails will be supplied by the Owner. The yard will support the production, delivery and fitting out of the sails.

The inventory and dimensions are provisional pending final design.

23.01 Inventory23.01.01 Main

Primary material:	t.b.d.
Secondary material:	t.b.d.
Dimensions:	47.3 Luff 15.5 foot 522 m ² Approx area

23.01.02 Sloop

Primary material:	t.b.d.
Secondary material:	t.b.d.
Dimensions:	45.2 Luff 14.7 LP 326 m ² Approx area

23.01.03 Staytail

Primary material:	t.b.d.
Secondary material:	t.b.d.
Dimensions:	34.5 Luff 9.9 LP 172 m ² Approx area

23.01.04 Storm Jib

Primary material:	t.b.d.
Secondary material:	t.b.d.
Dimensions:	22.4 Luff 5.6 LP 63 m ² Approx area

23.01.05 Genaker

Dimensions:	590 m ² approx.
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23.01.06 Asymmetrical spinnaker

Dimensions:	1000 m ² approx.
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TENDERS
The tender will be owner supplied.
The Buyer will work with the Owner's Representatives and suppliers to provide necessary
clothes and buying equipment for the showings, launch and reviewing of the tenders.
The Buyer will provide for receiving and storage of the tenders.